# ASSESSING QUALITY OF INSTRUCTION, STUDENT LEARNING, AND SATISFACTION FOR STUDENTS AT A DISTANCE

A Thesis

by

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ABSTRACT

The purpose of this study was to describe how assessing interactions in a distance course impact the quality of instruction, student leaning, and satisfaction with the course. This study, further describes how interactions can be enhanced with certain technologies.

The population for this research was both undergraduate and graduate students of the college of Agriculture and Natural Resources in National Chung-Hsing University (NCHU), in Taiwan. There are twelve departments under the College of Agriculture and Natural Resources including eleven departments and one graduate institute.

Data was collected from students at NCHU (Taiwan) by using Qualtrics (an online survey platform) through the Internet. All data of this research collected via Internet and used SPSS 20.0 to analysis data results. It is an anonymous survey that participants just receive the survey web address from email or academic platforms of each department. There is no any identification information for each participant.

According to the findings, there are some relationships between transactional distance theory, technology, and online education. The results of the regression model point out that the learner to the course content interaction is a significant predictor for satisfaction toward online classes. Learner to the course content interaction and learner to the instructor interaction are significant predictors for quality toward online classes. Learner to the course technology interaction and learner to the instructor interaction are significant predictors for learning toward online classes. Learner to the course content interaction and learner to the instructor interaction are significant predictors of enhanced

interactions in online classes. However, there is no interaction effect in learner to leaner interaction to enhance the satisfaction, quality, and learning. From the above data, the learner to the instructor interaction and the learner to the course content interaction are two important factors that influence learners' satisfaction, quality, and learning of online courses.

More participants involving in this research recommended increasing the reliability and the diversity of opinions. Besides, using the same instrument for diverse populations such as differences of culture, background, and majors may find more relationships in interactions and technologies in online education. Also, do more researches for enhancing the interaction between learner to learner and learner to the course technology. It is important to find more effective technologies and media for instructors to enhance learners' satisfaction, quality, and learning of online education.

# DEDICATION

I dedicate this research paper to all the people who are working and interested in online learning development, distance education, and technology use to continue their study.

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I would like to thank my committee chair, Dr. James Lindner, and my committee members, Dr. Robert Strong Jr., and Dr. R. Daniel Lineberger, for their guidance, encouragement, and support throughout the course of this research.

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# CHAPTER I

# INTRODUCTION AND FRAMEWORK

Online courses, regardless of whether students are on-campus or not, have become mainstream delivery platforms for those students seeking college degrees. On-line courses help students overcome time and place barriers by providing asynchronous instruction opportunities (Chai, 1999; Wang & Chen, 2003). Online courses can also take advantage of synchronous instructional technologies such as Skype, Centra and other tools to create interactions with students. For learners, those teaching tools not only save money and time for learning but also meet people at the same time without the restrictions of geographic problems. Online learning allows learners to take classes in any place with Internet access. Hence, go online is a main requirement for developing online courses. According survey of Internet usage of college students in Taiwan, Lin (2007) found that 90% of students use the Internet every day, and students' ages from sixteen to twenty-five are main Internet users in Taiwan.

The above records show that there are a large proportion of students using the Internet, in Taiwan. Lin (2007) noted that there are three kinds of categories of Internet activities that Taiwanese students have highly participations. First, social communications media provide students with a channel to interact with other students such as Face-time communication tools, BBS, e-mail, social networks, and blogs. Second, some students use searching engines for research and education such as Google and academic research databases. Third, students like using some relaxing programs and

on-line business activities such as online games, recreations, and online shopping. Because of the high frequencies of using Internet, it is good to encourage students to use the Internet as a new learning method. However, there are only a few universities in Taiwan that provide online courses for students. Chen (2001) said that because instructors in Taiwan lack the ability to control multiple media at one time and students lack channels to access online courses, idea of online learning unfamiliar with students in Taiwan. For better development of online courses in Taiwan, instructors need to be trained to harnessing online educational technologies before teaching (Chen, 2001).

On the other hand, there are lots of opportunities of study aboard and trainings out of school for agricultural related majors' students. Take students of Texas A&M University (TAMU) as an example; 70% of students think that study abroad is important to them because they can obtain some foreign experiences and foreign language skills, and increase opportunities for jobs (Briers, Shinn, & Nguyen, 2010; Lee, 2009; Siaya, 2002). The experiences and abilities reach diverse counties' agricultural developments are an influential part for agricultural majors' students. However, some students are unable to study aboard due to financial problems (Briers, Shinn, & Nguyen, 2010; Lee, 2009). Using online classes to interact with other countries students can be a good method to help students realize the goal of study aboard without the problem of money. Besides, learners can understand the differences of agricultural development in diverse cultures, backgrounds and environments, and different areas of the world via Internet and online courses. It is a helpful method to students to know concepts of international

agricultural changes and problem solving methods. It also can improve the interaction of agricultural development with other countries.

According to Briers et al., (2010), most of the students point that it is essential to students to study abroad or to take some curriculums which related to international knowledge and experience during student life. However, there are lots of barriers for students to involve in study abroad programs. Some external reasons such as curriculum constraints, time, expense, and lack of language abilities are limitations to students who failure to study abroad, and finance problems are the biggest barrier for students joining study abroad programs (Briers et al., 2010).

As a result, it is an important issue to instructors that understand how to provide and satisfy students' needs of agriculture related knowledge and experiences out of classroom. One of the suggestions for this problem is effective using multiple media and provides online resources or classes to support teaching and learning for students in agricultural related majors. Based on the above concepts, this research will focus on the attitudes of students in agricultural majors in National Chung-Hsing University (NCHU) in Taiwan toward taking on-line courses and using computer-based tools or media for learning.

**Statement of Problem**

There are some online classes provided for students in Taiwan now. However, only few students have experiences about taking classes online. The biggest reason is because the concept of online learning is still new in Taiwan. Besides, due to poor course design, inappropriate technology using, and lack of professional online teaching

instructors, Taiwanese students tended to take a face-to-face class than an online course if they can choose (Ku & Lohr, 2003; Wang & Reeves, 2007). Moreover, Frankola (2000) and Wang and Reeves (2007) said that technology problems and lack of interactions in online classes are two important factors for learners failure in taking classes online or drop out online classes.

Moore (1989) and Hillman, Wills, and Gunawardena (1994) present transactional distance theory that four interactions in online learning environments and usage of technologies are influential factors for learners' engagement and satisfaction in online learning. Effective using technologies and great interactions may key points for learners have successful learning outcomes in online courses.

Hence, the main ideas of this research are using Moore's (1989) transactional distance theory to find the relationship between theory and technologies to understand learners' perceptions of satisfaction, quality and student learning of online learning. Also, explore the influences of technologies in online learning classes to enhance interactions in online courses.

**Purpose of Study**

The purpose of this study was to describe how maximizing interactions in a distance course impact the quality of instruction, student leanings, and satisfaction with the course. This study, further describe how interaction can be enhanced with certain technologies.

## Objectives

The objectives of this study were to:

1. Describe learner to learner interactions of online class.
2. Describe learner to the instructor interactions of online class.
3. Describe learner to the course content interactions of online class.
4. Describe learner to the course technology interactions of online class.
5. Describe satisfaction, quality, and learning of online class.
6. Describe technologies used to enhance interactions.
7. Describe and explore the relationship among interactions, technologies and personal characteristics.
8. Compare Results of transactional distance theory with former studies.

## Theoretical Framework

Transactional distance theory is an idea to explain relationships between learners and teachers during the distance classes or some asynchronous learning environments (Moore, 1989). Based on Moore's theory (1989), there are four kinds of interaction facilitate in distance learning to help students be a self-directedness learner in online class: (1) Learner to learner interaction. Sharing and discussing opinions and topics with other learners might impact students' learning. (2) Learners to the instructor interaction. Understand how the interaction of learners to the instructor can influence learning in online class. (3) Learners to content interaction. Understand that what kinds of materials are more attractive people in learning. (4) Learners to technology interaction. Realizing

how technologies help students in online learning (Dooley et al., 2005). Four types of interactions play important role in online learning to impact students' learning results. Beside, Song, Singleton, Hill, and Koh (2004) point out that nice course design, and effective online technologies are helpful components for students gain better learning results in online learning. Hence, how instructors effectively using media and appropriate designing classes to improve the four types of interactions become an important part of delivering content in distance class in this study (Dooley, Lindner, & Dooley, 2005).

**Significance of Study**

Taking classes online is not only a trend in education but also common used in many countries of the world in recent years (Wang & Reeves, 2007). Instructors have to understand how to maintain the relationship between technologies and interactions in online courses. Hence, significances of this study are providing perspectives of importance of interactions, technologies and course design to both learners and instructors. For instance, they might have better understandings in how to improve the quality of online courses by knowing the influential interactions. Also, this study could be a good resource to instructors in National Chung-Hsing University (NCHU), in Taiwan to think about what kinds of technologies can provide better effects in online classes to increase learners' learning outcomes.

**Definitions of Terms**

Adult learning – "description of the process by which adults learn, and according to Knowles, adult learners are goal oriented, relevancy oriented, practical, autonomous,

self-directed, have prior knowledge and experience, and require respect from their instructors" (Dooley, Lindner & Dooley, 2005, p. 270).

Asynchronous – "a two-way communication method that does not happen at the same time" (Dooley, Lindner & Dooley, 2005, p. 271).

Distance Education – "process of delivering instructional resource-sharing opportunities to locations where the learner and the instructor do not physically meet at the same time" (Dooley, Lindner & Dooley, 2005, p. 276).

Distance learners – "learners who are separated from the instructor by geographic distance or by time" (Dooley, Lindner & Dooley, 2005, p.276).

Learner-learner interactions – "type of interaction that occurs between one learner and another learner, alone or in group settings, with or without the real-time presence of an instructor such as online-chats, threaded discussion, e-mail, point -to -point video conference, and audio calls" (Dooley, Lindner & Dooley, 2005, p.285).

Learner-instructor interactions – "student-teacher interactions undertaken to attempt to motivate and stimulate the learner and to allow for the clarification of misunderstandings by the learner in regard to the content such as lecture, e-mail, online editing and feed-back, evaluation of learning, ITV, streaming video, and voice over Power Points" (Dooley, Lindner & Dooley, 2005, p.285).

Learner-content interactions – "process of interacting with content to affect the learner's understanding, perspective, or cognitive structures such as online books, online instructional materials, support materials, worksheets, and case studies" (Dooley, Lindner & Dooley, 2005, p. 284).

Learner-technology interactions – "examples of learner-to-technology interactions include online tutorials on how to use educational technology, getting help online, downloading plug-ins, installing software, file management including uploading and downloading files, and electronic libraries" (Dooley, Lindner & Dooley, 2005, p. 285).

Multimedia – "refer to bringing together a number of diverse technologies of visual and audio media for the purpose of communicating such as text, graphics, audio, video, animations, and simulations" (Dooley, Lindner & Dooley, 2005, p. 287).

Synchronous – "two-way communication that is simultaneous or occurs at the same time such as Internet chat rooms and desktop videoconferencing systems" (Dooley, Lindner & Dooley, 2005, p. 291).

Transactional distance – "a measure of distance as a pedagogical phenomenon, and it involves the interactions between and among the instructors, the learners, the content, and the learning environment" (Dooley, Lindner & Dooley, 2005, p. 292).

**Assumptions**

1. Respondents will complete the instrument honestly to the best of their ability.
2. The data and analysis of the data will reflect the respondents' answers accurately.

**Limitations**

1. Because probabilistic sampling techniques where not used caution warranted against generalizing findings to a broader the sample than from which the data had collected in this study.

2. The original instrument had written in English and translated to Chinese by the researcher who is from Taiwan and fluent in Chinese. Some of meanings in the instrument might differ from the original one after translation.

# CHAPTER II

# REVIEW OF LITERATURE

## Distance Learning

Distance learning education is a teaching process to deliver knowledge by using multiple media to break limitations of space and time (Moore, 1989). One advantage of online learning is that instructors can easily manage learning content by using systematic course design (Wang & Chen, 2003). In contrast with traditional classes and teaching methods, distance learning is a new form of pedagogy that focuses on the computer and web-based instruction (Carr-Chellman & Duchastel, 2000; Lucas, 2007). Distant learning environments not only provide multiple learning channels, but also enhance teaching quality, academic exchanges, and information sharing. For example, instructors may post documents and materials on the web that allow students to learn and study at any time through the internet. Also they can get involved in online discussions and communicate with teachers after class (Wang & Chen, 2003).

Compared to the traditional learning method, using online classes for learning has some conflicts and changes for both students and teachers. Because of the change of media type, the change of the means of knowledge delivery, and the change of interaction methods, both learners and instructors have to adopt new kinds of creative learning or teaching methods in distance learning.

Lin and Berge (2005, p.38) point out that there are four important barriers for students in online learning: social interaction, administrative/ instructor issues, learner

motivation, and time/support for studies. Lack of social interaction is the most important barrier to online learning (Lin & Berge, 2005; Song, Singleton, Hill, & Koh, 2004). Also, there are many elements may influence the interaction of online course such as structure, class size, feedback provided to the students, and participants' prior experience with computer-mediated communication (CMC) settings (Vrasidas & McIsaac, 1999, p 27-29).

**Transactional Distance Theory**

The theory of transactional distance explains relationships between learners and teachers during the distance classes or other asynchronous learning environments (Moore, 1989). "The whole point and purpose of distance education theory is to summarize the different relationships and strength of relationship among and between these variables that make up transactional distance, especially the behaviors of teachers and learners (Moore, 1989, P.23)".

According to Moore's (1997) theory of transactional distance, there are three main factors of transactional distance between instructors and learners: dialogue, structure, and autonomy. Also, because distance classes' lack of face to face conversations and contact during knowledge delivery, students may lose their concentration without effective face-to-face dialogue. As a result, interactions with others, with the environments, and with the technologies during online learning, well-structured course contents and materials, and attitudes toward a self-directed learning become important to learners taking distance classes.

Think about the importance of dialogue between learners and instructors during learning. Conventional distance education relied on one-way teaching without interaction between learners and instructors, because media such as television and audiotapes are not conducive to responses from learners to instructors. In order to improve interactions between learners and instructors, teachers need to use some two-way interactive media which increase opportunities for teacher to receive questions and suggestions from learners (Moore, 1989).

Moore and Kearsley (1996) argue that there are strong relations between distance and interaction: the more distance, the less interaction and vice versa. In addition, the correlation between distance and interaction not only involves geography but also has to consider other factors which may influence learning quality such the relations with the materials, tools or environments (Chen, 2001). Environmental factors have huge influences on interactions between instructor and learners. For example, there is the question of how many students may be attending a distance class and how many times instructors need to communicate with their students during the class period (Moore, 1997)? Besides, instructors' personality, learners' personalities, and content also have important impacts on effective dialogues.

Furthermore, in diverse categories of education there are different levels of learners' interactions with instructors. For instance, science and mathematics mainly involve lecturing. On the other hand, social sciences and education are more focused on discussion, team work, or individual case study. Hence, based on different subjects,

instructors have to using different appropriate media in distant education for their students to reach effective learning levels (Moore, 1989).

Originally, Moore (1989) provided three main kinds of interactions in distance education including: learner to learner interaction, learner to instructor interaction, and learner to content interaction. With the development of telecommunication, Hillman, Wills, and Gunawardena (1994) added learner to technology interaction support the Moore's transactional distance theory.

The details of Moore's transactional distance theory model include four types of interaction (Dooley et al., 2005): (1) Learners to learners—How peers interactions impact learning such as sharing information, discussion or chat. (2) Learners to instructors—How to improve the interaction between learners and instructors by using technologies such as lecture, e-mail, online editing and feedback, or evaluation. (3) Learners to content—What kinds of materials are more attractive in learning such as using online books, online instructional material, or support materials. (4) Learners to technology—How technology help student in learning such as using online tutorials, getting help online, file management. In addition, the vicarious interaction which are maximized learning and satisfaction occurs when four interactions overlapping (see Figure 1).

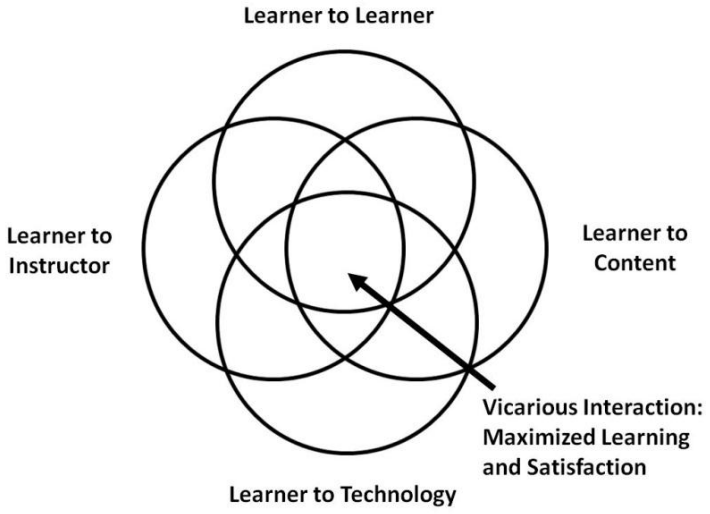


*Figure 1.* Depiction of vicarious interaction and maximized learning and satisfaction resulting from four learner relationships (Dooley et al., 2005).

**Satisfaction**

Researches point out that the predictor of learners' satisfaction toward online course and technologies is learner self-efficacy related to technologies, also called computer self-efficacy (Gunawardena, Linder-VanBerschot, LaPointe, & Rao, 2010). It is an important factor that influences learners in receiving and accepting contents and materials online without technical problems to enhance their satisfaction. Besides, Song, Singleton, Hill, & Koh (2004) point out that past experiences with technologies is one important factor influencing learners' perspectives of newer technologies used in online learning. Hence, experiences of using technologies may influence students' satisfaction with online education (Lawson, 2010).

On the other hand, interpersonal or social interactions such as learner to learner interactions and learners to the instructor interaction may effect learners' satisfaction. Also, frequency of interaction in Web-based instruction has to be considered (Jung, Choi, Lim, & Leem, 2002). Jung, Choi, Lim, & Leem (2002) also said that learners have higher satisfaction with the Web-based instruction and learning motivation when they experience better interactions with other learners. In addition, Gunawardena, Linder-VanBerschot, LaPointe, & Rao (2010) argue that learners who have higher levels of satisfaction are people whose participation more, present better learning outcomes, and are willing to take online classes constantly.

**Quality**

There are some main reasons learning quantity and quality may decrease with online learning. A lack of human interaction, steep learning curves involved in adjusting to new technology, delayed feedback, procrastination in learning alone, and lower motivation for reading online materials are good examples for influencing learning quality in online learning (Lim, & Morris, 2009, p. 283-285). Also, Sims, Dobbs, and Hand (2002, p. 137-146) suggested that instructors can improve the quality in online course by paying more attention in some factors when they are creating online courses: strategic intent, content, learning design, interface design, interactivity, assessment, student support, utility of content, and outcomes.

From the above factors which may affect the quality of online course, interactivity is the most important one. Providing effective interaction between learners to learners and learner to instructors could increase and maintain high course quality by

increasing the opportunities for interactions, and improving the time-management so instructors can effectively give feedback and response to students when they need it (Seidel, 2012).

**Learning**

Learners who were highly motivated and confident in learning have higher tendency than those with less motivation in getting more from online learning (Lim, & Morris, 2009). Design of the course, comfort with online technologies, and time management are three helpful components in online learning for students (Song, Singleton, Hill, & Koh, 2004, p.65).

For adult learners, learners to the instructor interaction and learner to learner interaction are crucial means by which to increase learning and to encourage active participation in online learning activities (Davis, & Wong, 2007; Jung, Choi, Lim, & Leem, 2002; Kuo, 2010). Besides, interactivity is not only a part of the computer-based transactions but also an important factor for teaching and learning in any learning environment (Sims, Dobbs, & Hand, 2002; Zhang, 2005, p. 143). As a result, in order to improve learning achievement in online learning, social and interpersonal feedbacks from instructors are very important.

**Factors for Effective Online Learning**

Webster and Hackley (1997) assert that whether the online course is effective to learners or not depends on their performances and participation as well as technology self-efficacy, cognitive engagement, and the relative perceived advantages or disadvantages of online delivery. Volery and Lord (2000, p. 217-219) also point out that

there are three main factors that may influence the effectiveness of online education: technology, instructor characteristics, and student characteristics. Convenient access, perceived richness information via technologies, teacher styles, and control of technology and attitudes towards technology by instructors, gender of learners, past online learning experiences are some examples of factors which may influence the effectiveness of online education (Volery & Lord, 2000). In addition, course design, learner motivation, time management, and comfort with online technologies are important elements learners need to experience successful online learning (Song, Singleton, Hill, & Koh, 2004).

The internet can be a good learning tool because it includes limitless information, creative and abnormal content and materials, or variety of communication tools (Chai, 1999). There are also some good examples of web-based technologies to support online learning including both synchronous (live, real-time) and asynchronous (distributed in time) discussion forums, email, and voice communication via audio or telephone (Carr-Chellman & Duchastel, 2000). As a result, with the development of online technologies, the trend is to use online course or distance classes as main means of teaching. There are also lots of advantages of choosing online classes as a main type of learning ways for students.

Unlike traditional courses, learners can easily manage their time in learning and studying with flexible time schedule due to most of class delivering contents and materials being permanently available via internet (Song, et al., 2004). Moreover, online classes annihilate geography by using internet so that learners can absorb knowledge and

different concepts from different places (Briers, et al., 2010). Furthermore, under the influence of online learning, according to their personal abilities or situations, people can adjust their unique path of learning and choose the content to they need to achieve their goals (Chiang, 2007). To some schools or companies, it's easier to them to build an online training course through the internet for their students or employee than a bricks-and-mortar classroom. Online courses not only save time and reduce the total cost but also reach the same learning results. Learners can save time by not having to take transportation to school, since they are able to take online classes anywhere people can reach internet. The main thing is, students must be self-motivated to take advantage of all these wonderful attributes of online learning (Mi, 2007).

Most online discussion of distance learning uses text-based tools such as discussion board/area, platforms, or online document sharing web spaces. For international students or some students who are afraid of asking questions and sharing opinions with other humans in person, text-based tools provide opportunities for them to write and revise their comments before sharing with all students in class (McIsaac, Blocher, Mahes & Vrasidas, 1999). This is a good attribute of online learning; it enhances engagement in class of all kinds of learners.

However, while there are lots of benefits of using distance class as an main education method, learning asynchronously at a distance still have some limitations. For instance, online classes lack of the opportunities to interact with other learners and instructors. Besides, different learners have diverse habits and using methods of internet and it is hard to evaluate the learning results after taking online courses (Wang, 2007).

McIsaac et al., (1999) also point out that students who are good at speaking but poor writers may have some difficulties when taking online class due to an abundance of text-based discussion.

Mixing different learning styles by combining the traditional teaching methods and online or distance learning methods also advantageous for learners. Students not only communicate and interact with their teacher in the class, but also get more content and material support from the internet by using multiple media (Mi, 2007). To sum up, using distance learning courses or online learning classes assist educational development.

**Be a Self–directed Learner via Internet**

"Learner autonomy is the extent to which in the teaching/learning relationship it is the learner rather than the teacher who determines the goals, the learning experiences, and the evaluation decision of the learning program (Moore, 1989, p. 31)". An autonomous leaner is self-directed learner who is positively motivated to learn.

Using online course to learn can enhance students' becoming self-directed learners by taking the advantage of the convenience and multi-functionality of the internet and diverse technologies. Learners can control the learning contents and directions of studying materials, and search information by choosing appropriate online course or resources (Chiang, 2007). "Computer-based education allows students to become active learners rather than mere passive recipients of teaching (Volery & Lord, 2000, p. 217)". Also, online databases or messages are important ways to help students to find information quickly, and share or exchange information, opinions and

experiences through the internet (Chiang, 2007; Wu, 2007). Moreover, for some specific students who learn and reflect slowly or need to personal special teaching, online course can avoid some embarrassing experiences and situation and get better learning results by following their own learning pace.

**The Development of Online Learning in Taiwan**

Instructors in universities in Taiwan have high tendency to deliver contents and knowledge via traditional teaching ways. For example, this takes place via textbooks, note, and PowerPoint for a face to face class. There are some disadvantages for a face to face traditional class, such as lack of convenience for time and space, loss of interpersonal interaction between leaners to learners, or learners to the instructor and failure develop real-world skills (Dooley et al., 2005; Reid, 2008). Distance learning method has been under development for many years in The United State; there are only few universities which have communication, technological, media related departments using creative learning methods such as using lots of media, combing diverse materials, or new technologies for teaching in Taiwan. Hence, most of students in Taiwan have fewer opportunities to take distance classes or learn through computer and Internet.

The earliest styles of distance learning in Taiwan were correspondences courses conducted by radio and television (Chai, 1999). There are three types of interactive distance education systems under development in Taiwan (Chu, 1999, p.111): first, Real-time multicast systems which allow learners take some courses from other universities or educational institutions. Second, Curriculum-on-demand systems provide students remote access to learning materials and learning by their own pace. Third, Virtual

classroom systems increase the interaction between learner to instructors and other learner via the computer network technology.

However, there are some limitations that make it difficult to increase the usage of digital learning in Taiwan. Instructors lack abilities to control multiple media, and students lack access to the new learning technology; most instructors need to undergo training in the use of different technologies before they can take their classes online (Chen, 2001).

One of the problems of developing online or distance classes in Taiwan is that most of teachers in Taiwan lack of the abilities to apply diverse teaching methods and media in their course or teaching, and lack of experiences and abilities to use those media well (Tu & Twu, 2002). Teachers need to training about the usage of technologies, especially, the latest kinds of media or other new kinds of networking tools. They also have to learn how to combine new technologies and different media with course content for a creative teaching. Although some teachers understand the advantages of using different media in teaching, they are still not familiar with its use. Besides, for some older teachers, they have to spend more time than younger teachers to understand new technologies. Thus some conventional instructors still insist on using traditional teaching methods. Hence, the idea of online class is not a new issue in Taiwan, but online courses are not yet mainstream in Taiwan.

The other problem is that even when there are students eager to experience distance learning classes lacking of channels technological glitches prevent them from having access (Tu & Twu, 2002). Because there are not too many universities and for

only some specific departments which have computer and internet available for learning in Taiwan there are low percentages of student able to experience learning via online courses or distance classes. Although some students in Taiwan still prefer traditional learning methods, online learners are growing in number. Also, if learners have no chance to access online courses or distance classes, they may be unable to understand the advantages of online learning. Hence, how to enhance students in Taiwan reach to distance classes and online courses is an important problem that needs to be solved.

In addition, from university administrators' points of view, it takes big amounts of money and time to set up and manage internet systems and online course. As a result, if university presidents try to development online course on campus, they have to gain better understanding of the main successful factors affecting online education beforehand (Volery & Lord, 2000).

On the other hand, Lin (2007) said that more than 90% of Taiwanese students aged sixteen to twenty-two are using internet every day. The above data show that most senior high school and college students are using the internet and computer a lot for diverse purposes in life. As a result, a new kind of learning method can be a have a big influence on teaching in Taiwan, according to Chu (1999) Moreover, students are already familiar with using communication media, search engines, and other internet tools since they have already spent a lot time on the internet (Lin, 2007). Hence, it is possible to promote distance classes or online learning in Taiwan when there are well-constructed course and learning contents or materials without technical usage problems to students in Taiwan.

**Students' Attitudes toward Online Learning and Technologies**

According to the research result of Seidel (2012), we know that there are some positive relationships between the interactions of learners with other learners, with the instructor, with the course content, and with the course technology. Seidel (2012) asks 55 master or PhD students at Texas A&M University in the ALEC 695 class about their experiences with distance learning, and multiple media. Questionnaires for this research also concern their perceptions of how satisfied they are with the quality of learning online.

For the results of Seidel (2012), participants think that using email and online chats, audio/phone calls can enhance the learners to learner interaction. Using email, online editing/feedback, and voice over PowerPoint can enhance the learners to the instructor interaction. Using online exercise, online instructional materials, online support materials, and interactive video can enhance the learners to the course content interaction. Using getting help online, electronic library and online tutorials can enhance the learners to the course technology interaction (Seidel, 2012). Besides, Seidel (2012) also found that participants tended agree that the learner to learner interaction and learner to the course content interaction can enhance learners' satisfaction, learning and quality of taking distance class.

# CHAPTER III

# METHODOLOGY

## Purpose of Study

The purpose of this study was to describe how maximizing interactions in a distance course impact the quality of instruction, student leanings, and satisfaction with the course. This study, further describe how interaction can be enhanced with certain technologies.

## Objectives

The objectives of this study were to:

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5. Describe satisfaction, quality, and learning of online class.
6. Describe technologies used to enhance interactions.
7. Describe and explore the relationship among interactions, technologies and personal characteristics.
8. Compare Results of transactional distance theory with former studies.

## Population

The population for this research was both undergraduate and graduate students at the college of Agriculture and Natural Resources in National Chung-Hsing University

(NCHU), in Taiwan. There are twelve departments in the College of Agriculture and Natural Resources including eleven Departments of Agronomy, Horticulture, Forestry, Applied Economics, Plant Pathology, Entomology, Animal Science, Soil Environmental Science, Soil and Water Conservation, Food Science and Biotechnology, Bio-industrial Mechatronics Engineering and one Graduate Institute of Bio-Industry Management. The total number of students in the College of Agriculture and Natural Resources is approximately 3,000. The number of students in the target population for this study was undergraduate and graduate students at the college of Agriculture and Natural Resources in NCHU. In the final, 173 students participant in this study and only 132 students of them completed the questionnaire, a 76.30% return rate.

**Instrumentation**

The instrument was developed by the Seidel (2012). The instrument has six-sections (see Appendix A-1 and Appendix A-2). Use five-point Likert response scale to present the result of Section I to V. The response choices are: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Neither Disagree or Agree," 4 = "Agree," 5 = "Strongly Agree." The native language of respondents was Chinese; hence, there were two versions of the questionnaire in different languages: English version (see Appendix A-1), and Chinese version (see Appendix A-2). Participants are all take Chinese version questionnaire.

First, before the six-section questions, the study asked learners' what their favorite learning method was. From this question, researchers can understand which learning method is preferred for participants in this study.

Second, there are eight questions in Section I that measured the level of interaction between the learner and other learners through the use of distance learning systems and media. These items focus on how the importance of improving the relationship between learners and other learners.

Third, there are seven questions in Section II that measured the level of interaction between the learner and the instructor through the use of distance learning systems and media. These items focus on how the importance of improving the relationship between learners and the instructor.

Fourth, there are ten questions in Section III that measured the level of interaction between the learner and course content through the use of distance learning systems and media. These items focus on how the importance of improving the relationship between learners and course content

Fifth, there are ten questions in Section IV that measured the level of interaction between the learner and course technology through the use of distance learning systems and media. These items focus on how the importance of improving the relationship between learners and course technology.

Sixth, the questions in Section V were used to measure the level of perceived satisfaction, quality, and learning experienced through interaction.

Seventh, the items in Section VI were used to measure the level of agreement with the question. Is the use of the following technology an effective means for enhancing interactions with other learners, the instructor, the course technology, or the

course content? The respondents were able to choose multiple responses for each given technology.

**Validity and Reliability**

Table 1 shows reliability estimates for the variables of interest. The commonly used rule for the reliability is Cronbach's alpha scale (Likert, 1932). The rules of Cronbach's alpha scale are: $\alpha \geq 0.9$ = excellent, $0.8 \leq \alpha < 0.9$ = good, $0.7 \leq \alpha < 0.8$ = Acceptable, $0.6 \leq \alpha < 0.7$ = questionable, $0.5 \leq \alpha < 0.6$ = poor, and $\alpha < 0.5$ = unacceptable (Likert, 1932). From the results shown on the Table 1, the reliability of learners to the course content interaction ($\alpha = 0.81$), and learner to the course technology interactions ($\alpha = 0.81$) were good, learner to learner interaction ($\alpha = 0.71$) was acceptable, but learner to instructor interaction ($\alpha = 0.59$) was poor. However, the reliability of total interactions was good ($\alpha = 0.87$). For more details of questions for each section, please see the Appendix A-1 and Appendix A-2.

Table 1

*Cronbach Alpha Coefficients for Scales of Instrument*

| Scales | Number of items | Cronbach Alpha |
|---|---|---|
| All Interactions | 31 | 0.87 |
| Learner to the Course content Interactions | 10 | 0.81 |
| Learner to the Course Technology Interactions | 7 | 0.81 |
| Learner to Learner Interactions | 7 | 0.71 |
| Learner to Instructor Interactions | 7 | 0.59 |

Note: $\alpha \geq 0.9$ = excellent, $0.8 \leq \alpha < 0.9$ = good, $0.7 \leq \alpha < 0.8$ = Acceptable, $0.6 \leq \alpha < 0.7$ = questionable, $0.5 \leq \alpha < 0.6$ = poor, and $\alpha < 0.5$ = unacceptable.

**Data Collection**

Data was collected using Qualtrics (an online survey platform) through the Internet. Data for this research were collected via Internet and SPSS 20.0 was used to analysis data results. Data was collected anonymously from participant. Participants were reached by email including the purpose of this research and asking for participation from each department office or an article talking about the needs of participations for this research on the department official websites in the College of Agriculture and Natural Resources, in NCHU. Also, for some of departments, researcher contacts friends to deliver online survey for increasing opportunities to reach population. IRB approved for the conduct of the research was received.

**Quantitative Analysis of Data**

The results of the summated scale of section I to section V are present by the mean, standard deviation, frequency, and percentage. The means ($M$) in this study represented: $1 \leq M \leq 1.49$ = strong disagree, $1.5 \leq M \leq 2.49$ = disagree, $2.5 \leq M \leq 3.49$ = neither agree nor disagree, $3.5 \leq M \leq 4.49$ = agree, and $4.5 \leq M \leq 5$ = strong agree. And the alpha in this study set a priority for all analysis at 0.05.

The result of relationships between learning means, satisfaction mean, quality mean, and four types of interactions mean was presented by the Pearson's product-moment correlation coefficients. Also, Davis' (1971) convention was used to interpret correlations. The magnitude of relationship are $r \leq 0.09$ = negligible relationship, $0.10 \leq r \leq 0.29$ = low relationship, $0.30 \leq r \leq 0.49$ = moderate relationship, $0.50 \leq r \leq 0.69$ = Substantial relationship, and $r \geq 0.70$ = Very Strong relationship (Davis', 1971).

**Limitations**

1. Because probabilistic sampling techniques where not used caution warranted against generalizing findings to a broader the sample than from which the data had collected in this study.

2. The original instrument had written in English and translated to Chinese by the researcher who is from Taiwan and fluent in Chinese. Some of meanings in the instrument might differ from the original one after translation.

# CHAPTER IV

# FINDINGS

## Purpose of Study

The purpose of this study was to describe how maximizing interactions in a distance course impact the quality of instruction, student leanings, and satisfaction with the course. This study, further describe how interaction can be enhanced with certain technologies.

## Objectives

The objectives of this study were to:

1. Describe learner to learner interactions of online class.
2. Describe learner to the instructor interactions of online class.
3. Describe learner to the course content interactions of online class.
4. Describe learner to the course technology interactions of online class.
5. Describe satisfaction, quality, and learning of online class.
6. Describe technologies used to enhance interactions
7. Describe and explore the relationship among interactions, technologies and personal characteristics.
8. Compare Results of transactional distance theory with former studies.

## Characteristics of Population

The total number of the population is 132 students who major in agricultural related departments in National Chung-Hsing University (NCHU), in Taiwan. From the

Table 2, 48.5% participants of the population are male, and 51.5% are female. For total 132 students, 47.7% of them are graduate students, 17.4% are seniors, 12.9% are sophomores, 12.1% are juniors, and 9.8% are freshman (see Table 2). There are twelve departments in the College of Agriculture and Natural Resources including eleven departments and one graduate institute in NCHU. From Table 2, 43.2% of participants from Agronomy, 22.0% of participants from Animal Science, 12.1% participants from Horticulture, 6.8% participants from Food Science and Biotechnology, 4.5% participants from Soil and Water Conservation, 3.0% participants from Bio-industrial Mechatronics Engineering, 3.0% participants from Forestry, 3.0% participants from Soil Environmental Science, 1.5% participants from Plant Pathology, 0.8% participants from Entomology and no participants from Applied Economics and Graduate Institute of Bio-Industry Management. Table 2 shows the GPA of participants, 57.6% participants' GPA range from 80-89, 28% participants' GPA range from 70-79, 8.3% participants' GPA range from 90-100, and 3.8% participants' GPA range from 60-69.

Table 2

*Description of Participants' Characteristic(s)*

| Characteristic (s) | | *f* | *%* |
|---|---|---|---|
| Gender | Male | 64 | 48.5 |
| | Female | 68 | 51.5 |

Table 2 Continued

| Characteristic (s) | | *f* | % |
|---|---|---|---|
| Grades | Graduated | 63 | 47.7 |
| | Senior | 23 | 17.4 |
| | Sophomore | 17 | 12.9 |
| | Junior | 16 | 12.1 |
| | Freshman | 13 | 9.8 |
| Major | Agronomy | 57 | 43.2 |
| | Animal Science | 29 | 22.0 |
| | Horticulture | 16 | 12.1 |
| | Food Science and Biotechnology | 9 | 6.8 |
| | Soil and Water Conservation | 6 | 4.5 |
| | Bio-industrial Mechatronics Engineering | 4 | 3.0 |
| | Forestry | 4 | 3.0 |
| | Soil Environmental Science | 4 | 3.0 |
| | Plant Pathology | 2 | 1.5 |
| | Entomology | 1 | 0.8 |
| | Applied Economics | 0 | 0 |
| | Graduate Institute of Bio-Industry Management | 0 | 0 |
| GPA | 80-89 | 76 | 57.6 |
| | 70-79 | 37 | 28.0 |
| | 90-100 | 11 | 8.3 |
| | 60-69 | 5 | 3.8 |

**Favorite Learning Methods of Population**

In the beginning of the questionnaire in this research, participants have to answer their favorite learning methods for their studies, including using iPhone/smart phone, computer, and textbook. Most students prefer to use computer ($f$ = 66, 60.6%) as their main learning method (Table 2). Textbooks ($f$ = 40, 36.7%) are the second favorite way for learning, and iPhone/smart phone ($f$ = 3, 2.8%) is not a popular learning tool for students in Taiwan. It's a single choice question, but according to the data that there are 23 of all 132 participants have multiple choice of this question. Based on the above results, computer and other related tools or technologies are necessary tools for students

to learn. Hence, how different technologies and media influence students' learning and performances becoming an influential issue.

Table 3

*Description of Students' Favorite Way to Learn*

| | *f* | % |
|---|---|---|
| iPhone | 3 | 2.8 |
| Computer | 66 | 60.6 |
| Textbook | 40 | 36.7 |

**Objective One: Learner to Learner Interaction**

In section I, describe learner to learner interactions of online class. Overall ($M$ = 3.61, $SD$ = 0.89) students tended to agree that distance education technologies could be used to increase learner to learner interactions (see Table 4). The distance education technologies to enhance learner to learner interactions are online chats, email, audio/phone call, social sites (Ex: Facebook), instant messaging, blogging, and collaborative documents, assistant and improve their interactions with other students.

From Table 4, 34.1% of participants strong agreed and 47% of participants agreed that collaborative documents enhanced learner to learner interactions. 21.2% of participants strong agreed and 53% of participants agreed that social sites such as Facebook enhanced learner to learner interactions (see Table 4). 12.9% of participants strong agreed and 38.6% of participants agreed that audio/phone call enhanced learner to learner interactions (see Table 4). On the other hand, only 6.1% of participants strong

agreed and 47.7% of participants agreed that email enhanced learner to learner interactions, and only 6.1% of participants strong agreed and 42.4% of participants agreed that online chats enhanced learner to learner interactions (see Table 4).

Table 4

*Description of Technologies to Enhance Learner to Learner Interaction*

| | *M* | *SD* | *Strongly Disagree* | | *Disagree* | | *Neither Agree nor Disagree* | | *Agree* | | *Strongly Agree* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *f* | *%* | *f* | *%* | *f* | *%* | *f* | *%* | *f* | *%* |
| Collaborative documents | 4.11 | 0.83 | 2 | 1.5 | 2 | 1.5 | 21 | 15.9 | 62 | 47 | 45 | 34.1 |
| Social Sites (EX: Facebook) | 3.86 | 0.89 | 4 | 3 | 4 | 3 | 26 | 19.7 | 70 | 53 | 28 | 21.2 |
| Instant messaging | 3.66 | 0.84 | 2 | 1.5 | 9 | 6.8 | 37 | 28 | 68 | 51.5 | 16 | 12.1 |
| Audio/phone call | 3.52 | 0.90 | 3 | 2.3 | 10 | 7.6 | 51 | 38.6 | 51 | 38.6 | 17 | 12.9 |
| Email | 3.48 | 0.82 | 3 | 2.3 | 10 | 7.6 | 48 | 36.4 | 63 | 47.7 | 8 | 6.1 |
| Online chats | 3.35 | 0.92 | 6 | 4.5 | 14 | 10.6 | 48 | 36.4 | 56 | 42.4 | 8 | 6.1 |
| Blogging | 3.3 | 0.92 | 5 | 3.8 | 17 | 12.9 | 53 | 40.2 | 47 | 35.6 | 10 | 7.6 |

Note: Scale Strongly Disagree = 1; Disagree = 2; Neither Agree nor Disagree = 3; Agree = 4; Strongly Agree = 5. An overall construct score was computed $M = 3.61$; $SD = 0.53$

**Objective Two: Learner to Instructor Interaction**

In section II, overall ($M = 3.46$, $SD = 0.48$) students tended to agree that distance education technologies could be used to increase learner to the instructor interactions (see Table 5). The distance education technologies to enhance learner to the instructor interactions are lecture, streaming video, email, voice over power points, online editing and feedback, audio/phone call, evaluation.

From Table 5, 24.2% of participants strong agreed and 50% of participants agreed that lecture enhanced learner to the instructor interactions. 12.1% of participants strong agreed and 51.5% of participants agreed that online editing and feedback

enhanced learner to the instructor interactions (see Table 5). 12.1% of participants strong agreed and 34.1% of participants agreed that audio/phone call enhanced learner to the instructor interactions (see Table 5). On the other hand, only 8.3% of participants strong agreed and 42.4% of participants agreed that streaming video enhanced learner to the instructor interactions (see Table 5). Besides, only 3% of participants strong agreed and 14.4% of participants agreed that evaluation enhanced learner to the instructor interactions (see Table 5).

Table 5

*Description of Technologies to Enhance Learner to Instructor Interaction*

| | *M* | *SD* | *Strongly Disagree* | | *Disagree* | | *Neither Agree nor Disagree* | | *Agree* | | *Strongly Agree* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *f* | *%* | *f* | *%* | *f* | *%* | *f* | *%* | *f* | *%* |
| Lecture | 3.95 | 0.79 | 1 | 0.8 | 3 | 2.3 | 30 | 22.7 | 66 | 50 | 32 | 24.2 |
| Online editing and feedback | 3.68 | 0.80 | 2 | 1.5 | 6 | 4.5 | 40 | 30.3 | 68 | 51.5 | 16 | 12.1 |
| Email | 3.58 | 0.83 | 2 | 1.5 | 8 | 6.1 | 49 | 37.1 | 58 | 43.9 | 15 | 11.4 |
| Streaming video | 3.45 | 0.86 | 3 | 2.3 | 12 | 9.1 | 50 | 37.9 | 56 | 42.4 | 11 | 8.3 |
| Audio/phone call | 3.42 | 0.94 | 4 | 3 | 14 | 10.6 | 53 | 40.2 | 45 | 34.1 | 16 | 12.1 |
| Voice over power points | 3.4 | 0.96 | 5 | 3.8 | 15 | 11.4 | 48 | 36.4 | 50 | 37.9 | 14 | 10.6 |
| Evaluation | 2.72 | 0.96 | 16 | 12.1 | 32 | 24.2 | 61 | 46.2 | 19 | 14.4 | 4 | 3 |

Note: Scale Strongly Disagree = 1; Disagree = 2; Neither Agree nor Disagree = 3; Agree = 4; Strongly Agree = 5. An overall construct score was computed $M = 3.46$; $SD = 0.48$

**Objective Three: Learner to the Course Content Interaction**

In section III, overall ($M$ = 3.88, $SD$ = 0.43) students tended to agree that distance education technologies could be used to increase learner to the course content interactions (see Table 6). The distance education technologies to enhance learner to the course content interactions are text, online instructional ,materials worksheets, support

materials, worksheets, case studies, power points, interactive video, online exercises, podcasting, and collaborative document.

From Table 6, 22.7% of participants strong agreed and 64.4% of participants agreed that case studies enhanced learner to the course content interactions. And, 20.5% of participants strong agreed and 60.6% of participants agreed that collaborative documents enhanced learner to the course content interactions (see Table 6). 18.9% of participants strong agreed and 56.8% of participants agreed that Power Points enhanced learner to the course content interactions (see Table 6). On the other hand, only 9.8% of participants strong agreed and 60.6% of participants agreed that online exercise enhanced learner to the course content interactions (see Table 6). Besides, only 6.8% of participants strong agreed and 53% of participants agreed that worksheets enhanced learner to the course content interactions (see Table 6).

Table 6

*Description of Technologies to Enhance Learner to Course Content Interaction*

| | *M* | *SD* | *Strongly Disagree* | | *Disagree* | | *Neither Agree nor Disagree* | | *Agree* | | *Strongly Agree* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *f* | *%* | *f* | *%* | *f* | *%* | *f* | *%* | *f* | *%* |
| Case studies | 4.09 | 0.61 | 0 | 0 | 1 | 0.8 | 16 | 12.1 | 85 | 64.4 | 30 | 22.7 |
| Support materials | 4.03 | 0.59 | 0 | 0 | 0 | 0 | 21 | 15.9 | 86 | 65.2 | 25 | 18.9 |
| Collaborative documents | 3.98 | 0.72 | 0 | 0 | 5 | 3.8 | 20 | 15.2 | 80 | 60.6 | 27 | 20.5 |
| Interactive video | 3.93 | 0.68 | 1 | 0.8 | 2 | 1.5 | 23 | 17.4 | 85 | 64.4 | 21 | 15.9 |
| Online instructional materials | 3.92 | 0.59 | 0 | 0 | 0 | 0 | 29 | 22 | 85 | 64.4 | 18 | 13.6 |
| Power Points | 3.88 | 0.81 | 2 | 1.5 | 5 | 3.8 | 25 | 18.9 | 75 | 56.8 | 25 | 18.9 |
| Text | 3.85 | 0.72 | 0 | 0 | 5 | 3.8 | 30 | 22.7 | 77 | 58.3 | 20 | 15.2 |
| Podcasting | 3.76 | 0.73 | 1 | 0.8 | 5 | 3.8 | 34 | 25.8 | 77 | 58.3 | 15 | 11.4 |
| Online exercises | 3.71 | 0.80 | 3 | 2.3 | 6 | 4.5 | 30 | 22.7 | 80 | 60.6 | 13 | 9.8 |
| Worksheets | 3.61 | 0.71 | 1 | 0.8 | 5 | 3.8 | 47 | 35.6 | 70 | 53 | 9 | 6.8 |

Note: Scale Strongly Disagree = 1; Disagree = 2; Neither Agree nor Disagree = 3; Agree = 4; Strongly Agree = 5. An overall construct score was computed $M = 3.88$; $SD = 0.43$

**Objective Four: Learner to the Course Technology Interaction**

In section IV, overall ($M$ = 3.85, $SD$ = 0.5) students tended to agree that distance education technologies could be used to increase learner to the course technology interactions (see Table 7). The distance education technologies to enhance learner to the course technology interactions are online tutorials, getting help online, online instructions for downloading plugins, electronic libraries, software applications, a file management system, search engines.

From Table5, 43.2% of participants strong agreed and 44.7% of participants agreed that search engines enhanced learner to the course technology interactions. And, 25.8% of participants strong agreed and 53% of participants agreed that electronic libraries enhanced learner to the course technology interactions (see Table 7). 18.9% of participants strong agreed and 47% of participants agreed that software applications enhanced learner to the course technology interactions (see Table 7). On the other hand, only 9.8% of participants strong agreed and 55.3% of participants agreed that online tutorials enhanced learner to the course technology interactions (see Table 7). Besides, only 8.3% of participants strong agreed and 50.8% of participants agreed that getting help online enhanced learner to the course technology interactions (see Table 7).

Table 7

*Description of Technologies to Enhance Learner to Course Technology Interaction*

| | *M* | *SD* | *Strongly Disagree* | | *Disagree* | | *Neither Agree nor Disagree* | | *Agree* | | *Strongly Agree* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *f* | *%* | *f* | *%* | *f* | *%* | *f* | *%* | *f* | *%* |
| Search engines | 4.3 | 0.72 | 0 | 0 | 2 | 1.5 | 14 | 10.6 | 59 | 44.7 | 57 | 43.2 |
| Electronic libraries | 4.02 | 0.74 | 0 | 0 | 3 | 2.3 | 25 | 18.9 | 70 | 53 | 34 | 25.8 |
| Online instructions for downloading plugins | 3.8 | 0.69 | 0 | 0 | 5 | 3.8 | 32 | 24.2 | 79 | 59.8 | 16 | 12.1 |
| Software applications | 3.8 | 0.81 | 1 | 0.8 | 4 | 3 | 40 | 30.3 | 62 | 47 | 25 | 18.9 |
| Online tutorials | 3.72 | 0.68 | 0 | 0 | 4 | 3 | 42 | 31.8 | 73 | 55.3 | 13 | 9.8 |
| A file management system | 3.72 | 0.75 | 0 | 0 | 6 | 4.5 | 42 | 31.8 | 67 | 50.8 | 17 | 12.9 |
| Getting help online | 3.62 | 0.73 | 1 | 0.8 | 5 | 3.8 | 48 | 36.4 | 67 | 50.8 | 11 | 8.3 |

Note: Scale Strongly Disagree = 1; Disagree = 2; Neither Agree nor Disagree = 3; Agree = 4; Strongly Agree = 5. An overall construct score was computed $M = 3.85$; $SD = 0.5$

**Objective Five: Satisfaction, Quality, and Learning**

In Section V, participants have to according to their experiences of interactions with other learners, with the instructor, with the course content, and with the course technology to describe satisfaction, quality, and learning of online learning.

Based on the Table 8, 87.9% participants agree that they perceive great satisfaction in online courses when the learner to learner interactions provided. 80.3% participants agree that they perceive greater satisfaction in online courses when the learner to the instructor interactions provided (see Table 8). 76.5% participants agree that they perceive greater satisfaction in online courses when the learner to the course technology interactions provided (see Table 8). 67.4% participants agree that they perceive greater satisfaction in online courses when the learner to the course content interactions provided (see Table 8).

Based on the Table 8, 97.7% participants agree that they get better quality of online courses when the learner to the instructor interactions provided. 96.2% participants agree that they get better quality of online courses when the learner to learner interactions provided (see Table 8). 91.7% participants agree that they get better quality of online courses when the learner to the course technology interactions provided (see Table 8). 79.5% participants agree that they get better quality of online courses when the learner to the course content interactions provided (see Table 8).

Based on the Table 8, 95.5% participants agree that they perceive increased learning when the learner to learner interactions provided. 93.2% participants agree that they perceive increased learning when the learner to the instructor interactions provided (see Table 8). 83.3% participants agree that they perceive increased learning when the learner to the course technology interactions provided (see Table 8). 66.7% participants agree that they perceive increased learning when the learner to the course content interactions provided (see Table 8).

Table 8

*Description of Students' Satisfaction, Quality, and Learning toward Online Learning*

| | *Disagree* | | *Agree* | |
|---|---|---|---|---|
| **Satisfaction** | *f* | % | *f* | % |
| opportunities for interaction with other students provided | 16 | 12.1 | 116 | 87.9 |
| opportunities for interaction with the instructor provided | 26 | 19.7 | 106 | 80.3 |
| opportunities for interaction with technology provided | 31 | 23.5 | 101 | 76.5 |
| opportunities for interaction with content provided | 43 | 32.6 | 89 | 67.4 |
| **Quality** | | | | |
| opportunities for interaction with the instructor provided | 3 | 2.3 | 129 | 97.7 |
| opportunities for interaction with other students provided | 5 | 3.8 | 127 | 96.2 |
| opportunities for interaction with technology provided | 11 | 8.3 | 121 | 91.7 |
| opportunities for interaction with content provided | 27 | 20.5 | 105 | 79.5 |
| **Learning** | | | | |
| opportunities for interaction with other students provided | 6 | 4.5 | 126 | 95.5 |
| opportunities for interaction with the instructor provided | 9 | 6.8 | 123 | 93.2 |
| opportunities for interaction with technology provided | 22 | 16.7 | 110 | 83.3 |
| opportunities for interaction with content provided | 44 | 33.3 | 88 | 66.7 |

Based on the Table 9, participants tended agree ($M$ = 1.78, $SD$ = 0.31) that when there are some opportunities of interactions provided with other learners, opportunities of interactions provided with the instructor, opportunities of interactions provided with the course content, and opportunities of interactions provided with the course technology, they might much have satisfied in their learning.

Based on the Table 9, participants tended agree ($M$ = 1.91, $SD$ = 0.19) that when there are some opportunities of interactions provided with other learners, opportunities of interactions provided with the instructor, opportunities of interactions provided with the course content, and opportunities of interactions provided with the course technology, those interactions will enhance the quality during the learning process.

Based on the Table 9, participants tended agree ($M$ = 1.85, $SD$ = 0.23) that when there are some opportunities of interactions provided with other learners, opportunities of interactions provided with the instructor, opportunities of interactions provided with the course content, and opportunities of interactions provided with the course technology, those interactions increasing participants' desire in learning.

Table 9

*Agreement of Students' Satisfaction, Quality, and Learning toward Online Learning*

| | *n* | *M* | *SD* |
|---|---|---|---|
| Satisfaction | 132 | 1.78 | 0.31 |
| Quality | 132 | 1.91 | 0.19 |
| Learning | 132 | 1.85 | 0.23 |

Note: Scale Disagree = 1; Agree = 2

**Objective Six: Describe the Data Using Pearson Correlation Coefficient**

Table 10 is the results of relationships between learning mean, satisfaction mean, quality mean, learner to learner mean, learner to instructor mean, learner to the course content mean, and learner to the course technology mean. Results present by the Pearson's product-moment correlation coefficients and Davis' (1971) convention. According to the Davis convention (1971), the magnitudes of relationship are $r \leq 0.09$ = negligible relationship, $0.10 \leq r \leq 0.29$ = low relationship, $0.30 \leq r \leq 0.49$ = moderate relationship, $0.50 \leq r \leq 0.69$ = substantial relationship, and $0.70 \leq r$ = very Strong relationship.

The overall enhanced interaction mean score had a very strong correlation ($r$ = .78) with the learning mean, a very strong correlation ($r$ = .79) with the satisfaction mean, a very strong correlation ($r$ = .81) with quality mean, a low correlation ($r$ = .20) with the learner to learner mean, a moderate correlation ($r$ = .38) with the learner to instructor mean, a moderate correlation ($r$ = .40) with the learner to the course content mean, and a moderate correlation ($r$ = .35) with the learner to the course technology mean (see Table 10). The overall learner to the course technology mean score had a moderate correlation ($r$ = .37) with the learning mean, a low correlation ($r$ = .24) with the satisfaction mean, a low correlation ($r$ = .21) with quality mean, a moderate correlation ($r$ = .34) with the learner to learner mean, a moderate correlation ($r$ = .37) with the learner to instructor mean, and a substantial correlation ($r$ = .57) with the learner to the course content mean (see Table 10). The overall the learner to the course content mean score had a moderate correlation ($r$ = .33) with the learning mean, a moderate correlation ($r$ = .30) with the satisfaction mean, a moderate correlation ($r$ = .34) with quality mean, a low correlation ($r$ = .29) with the learner to learner mean, and a moderate correlation ($r$ = .49) with the learner to instructor mean (see Table 10). The overall learner to instructor mean score had a moderate correlation ($r$ = .34) with the learning mean, a low correlation ($r$ = .27) with the satisfaction mean, a moderate correlation ($r$ = .31) with quality mean, and a moderate correlation ($r$ = .40) with the satisfaction mean (see Table 10). The overall quality mean score had a substantial correlation ($r$ = .66) with the learning mean and a moderate correlation ($r$ = .42) with the satisfaction mean (see Table 10). The overall satisfaction mean score had a moderate

correlation ($r$ = .32) with the learning mean (see Table 10). The overall learner to learner mean score had a low correlation ($r$ = .18) with the quality mean (see Table 10).

From the above results, we can assume that there are significant correlations between interactions of the learner to learner, learner to instructor, learner to the course content, and learner to the course technology.

Table 10

*Pearson Correlation Coefficients of Satisfaction, Quality, Learning, and Interactions' Means*

| | | **Learning Mean** | **Satisfaction Mean** | **Quality Mean** | **Learner to Learner Mean** | **Learner to Instructor Mean** | **Learner to Content Mean** | **Learner to Technology Mean** | **Enhanced Interaction Mean** |
|---|---|---|---|---|---|---|---|---|---|
| Learning Mean | Pearson Correlation | 1 | - | - | - | - | - | - | - |
| Satisfaction Mean | Pearson Correlation | .32* | 1 | - | - | - | - | - | - |
| Quality Mean | Pearson Correlation | .66* | .42* | 1 | - | - | - | - | - |
| Learner to Learner Mean | Pearson Correlation | .13 | .16 | .18* | 1 | - | - | - | - |
| Learner to Instructor Mean | Pearson Correlation | .34* | .27* | .31* | .40* | 1 | - | - | - |

Table 10 Continued

| | | Learning Mean | Satisfaction Mean | Quality Mean | Learner to Learner Mean | Learner to Instructor Mean | Learner to Content Mean | Learner to Technology Mean | Enhanced Interaction Mean |
|---|---|---|---|---|---|---|---|---|---|
| Learner to Content Mean | Pearson Correlation | .33* | .30* | .34* | .29* | .49* | 1 | - | - |
| Learner to Technology Mean | Pearson Correlation | .37* | .24* | .21* | .34* | .37* | .57* | 1 | - |
| Enhanced Interaction Mean | Pearson Correlation | .78* | .79* | .81* | .20* | .38* | .40* | .35* | 1 |

*. Correlation is significant at the 0.05 level (2-tailed).

**Objective Seven: Describe the Learners' Perception of the Effectiveness of Different Technologies at Enhancing Interaction**

In section VI, describe technologies used to enhance interactions. Table 11 shows that the most useful technologies to enhance the interaction with other learners are online editing and feedback (*f* = 103, 78%), Facebook (*f* = 102, 77.3%), case studies (*f* = 99, 75%), and online quizzes (*f* = 95, 72%). The less effective technologies to enhance the interaction with other learners are lecture (*f* = 18, 13.6%), getting help online (*f* = 17, 12.9%), and online calendar (*f* = 15, 11.4%).

Table 11

*Enhancement of Technologies with Other Learners*

| | *With Other Learner* | |
|---|---|---|
| Technology | *f* | % |
| Online editing and feedback | 103 | 78 |
| Facebook | 102 | 77.3 |
| Case studies | 99 | 75 |
| Online quizzes | 95 | 72 |
| Threaded discussions | 94 | 71.2 |
| Audio/ phone call | 91 | 68.9 |
| Collaborative documents | 80 | 60.6 |
| Email | 79 | 59.8 |
| Interactive video conference | 79 | 59.8 |
| Role play/simulations | 78 | 59.1 |
| Plurk | 71 | 53.8 |
| Blogging | 68 | 51.5 |
| Online instructional materials | 68 | 51.5 |
| Twitter | 65 | 49.2 |
| Internet links | 54 | 40.9 |
| Instant messaging | 39 | 29.5 |
| Guest lectures | 38 | 28.8 |
| Support materials | 37 | 28 |
| Text | 37 | 28 |
| Instructor announcements | 33 | 25 |
| Online Chat | 33 | 25 |
| PowerPoint | 32 | 24.2 |
| Worksheets | 32 | 24.2 |
| Online tutorials | 28 | 21.2 |
| Short online video | 23 | 17.4 |
| Voice over PowerPoint | 22 | 16.7 |
| Lecture | 18 | 13.6 |
| Getting help online | 17 | 12.9 |
| Online calendar | 15 | 11.4 |

Table 12 shows that the most useful technologies to enhance the interaction with the instructor are internet links (*f* = 120, 90.9%), case studies (*f* = 99, 75%), Email (*f* = 99, 75%), and guest lectures (*f* = 93, 70.5%). The less effective technologies to enhance

the interaction with the instructor are short online video (*f* = 36, 27.3%), online tutorials (*f* = 32, 24.2%), getting help online (*f* = 25, 18.9%), and lecture (*f* = 25, 18.9%).

Table 12

*Enhancement of Technologies with the Instructor*

| | *With the Instructor* | |
|---|---|---|
| Technology | *f* | *%* |
| Internet links | 120 | 90.9 |
| Case studies | 99 | 75 |
| Email | 99 | 75 |
| Guest lectures | 93 | 70.5 |
| Online instructional materials | 86 | 65.2 |
| Online Chat | 85 | 64.4 |
| Collaborative documents | 82 | 62.1 |
| Facebook | 76 | 57.6 |
| Online editing and feedback | 75 | 56.8 |
| PowerPoint | 74 | 56.1 |
| Blogging | 71 | 53.8 |
| Audio/ phone call | 70 | 53 |
| Interactive video conference | 70 | 53 |
| Threaded discussions | 67 | 50.8 |
| Online quizzes | 65 | 49.2 |
| Role play/simulations | 62 | 47 |
| Instructor announcements | 60 | 45.5 |
| Voice over PowerPoint | 59 | 44.7 |
| Support materials | 56 | 42.4 |
| Worksheets | 58 | 43.9 |
| Twitter | 50 | 37.9 |
| Plurk | 48 | 36.4 |
| Text | 44 | 33.3 |
| Instant messaging | 43 | 32.6 |
| Online calendar | 39 | 29.5 |
| Short online video | 36 | 27.3 |
| Online tutorials | 32 | 24.2 |
| Getting help online | 25 | 18.9 |
| Lecture | 25 | 18.9 |

Table 13 shows that the most useful technologies to enhance the interaction with the course content are online tutorials (*f* = 109, 82.6%), text (*f* = 106, 80.3%), support materials (*f* = 104, 78.8), and instant messaging (*f* = 97, 79.5%). The less effective technologies to enhance the interaction with the course content are online editing and feedback (*f* = 21, 15.9%), Twitter (*f* = 21, 15.9%), online quizzes (*f* = 19, 14.4%), Plurk (*f* = 18, 13.6%), and audio/ phone call (*f* = 15, 11.4%).

Table 13

*Enhancement of Technologies with the Course content*

| | *With Course Content* | |
|---|---|---|
| | *f* | *%* |
| Online tutorials | 109 | 82.6 |
| Text | 106 | 80.3 |
| Instant messaging | 97 | 79.5 |
| Support materials | 104 | 78.8 |
| Collaborative documents | 94 | 71.2 |
| Short online video | 94 | 71.2 |
| PowerPoint | 92 | 69.7 |
| Online calendar | 86 | 65.2 |
| Voice over PowerPoint | 84 | 63.6 |
| Worksheets | 81 | 61.4 |
| Internet links | 70 | 53 |
| Guest lectures | 66 | 50 |
| Online instructional materials | 66 | 50 |
| Getting help online | 60 | 45.5 |
| Instructor announcements | 60 | 45.5 |
| Blogging | 58 | 43.9 |
| Role play/simulations | 58 | 43.9 |
| Online Chat | 56 | 42.4 |
| Threaded discussions | 53 | 40.2 |
| Case studies | 52 | 39.4 |
| Facebook | 47 | 35.6 |
| Lecture | 40 | 30.3 |

Table 13 Continued

| | *With Course Content* | |
|---|---|---|
| | *f* | % |
| Email | 38 | 28.8 |
| Interactive video conference | 30 | 22.7 |
| Online editing and feedback | 21 | 15.9 |
| Twitter | 21 | 15.9 |
| Online quizzes | 19 | 14.4 |
| Plurk | 18 | 13.6 |
| Audio/ phone call | 15 | 11.4 |

Table 14 shows that the most useful technologies to enhance the interaction with the course technology are instructor announcements (*f* = 75, 56.8%), getting help online (*f* = 73, 55.3%), online instructional materials (*f* = 73, 55.3%), and instant messaging (*f* = 72, 54.5%). The less effective technologies to enhance the interaction with the course technology are audio/ phone call (*f* = 9, 6.8%), guest lectures (*f* = 9, 6.8%), role play/simulations (*f* = 17, 12.9%), internet links (*f* = 17, 12.9%), and case studies (*f* = 17, 12.9%).

Table 14

*Enhancement of Technologies with the Course Technology*

| | *With Course Technology* | |
|---|---|---|
| Technology | *f* | *%* |
| Instructor announcements | 75 | 56.8 |
| Getting help online | 73 | 55.3 |
| Online instructional materials | 73 | 55.3 |
| Instant messaging | 72 | 54.5 |
| Lecture | 68 | 51.5 |
| Online calendar | 67 | 50.8 |
| Online tutorials | 65 | 49.2 |
| Collaborative documents | 61 | 46.2 |
| Short online video | 52 | 39.4 |
| Voice over PowerPoint | 44 | 33.3 |
| Threaded discussions | 40 | 30.3 |
| Facebook | 39 | 29.5 |
| Text | 37 | 28 |
| Support materials | 35 | 26.5 |
| Online Chat | 35 | 26.5 |
| PowerPoint | 32 | 24.2 |
| Blogging | 30 | 22.7 |
| Email | 28 | 21.2 |
| Interactive video conference | 28 | 21.2 |
| Online editing and feedback | 24 | 18.2 |
| Worksheets | 22 | 16.7 |
| Online quizzes | 21 | 15.9 |
| Plurk | 21 | 15.9 |
| Twitter | 18 | 13.6 |
| Case studies | 17 | 12.9 |
| Internet links | 17 | 12.9 |
| Role play/simulations | 17 | 12.9 |
| Audio/ phone call | 9 | 6.8 |
| Guest lectures | 9 | 6.8 |

Table 15 is the results description of all the given technologies in section VI including the frequency of choices for each interaction, the percentage of total selection from participants, and the mean across variables. The mean across variables is the

averages of the means of with the learner to learner interaction, with the learner to the instructor interaction, with the learner to the course content interaction, and with the learner to the course technology for each technology.

Based on the Table 15, collaborative documents ($M$ = 2.4), online instructional materials ($M$ = 2.22), case studies ($M$ = 2.02), Facebook ($M$ = 2), and internet links ($M$ = 1.98) are the most effective means of the all given technologies to enhance interactions. On the other hand, getting help online ($M$ = 1.33), Plurk ($M$ = 1.2), Twitter ($M$ = 1.17), and lecture ($M$ = 1.14) are the less effective means of the all given technologies to enhance interactions.

Table 15

*Vicarious Interactions by Technologies*

| | With other Learner | | With the Instructor | | With the Content | | With the Technology | | Mean Selection Across Variables |
|---|---|---|---|---|---|---|---|---|---|
| | *f* | % | *f* | % | *f* | % | *f* | % | *M* |
| Collaborative documents | 80 | 60.6 | 82 | 62.1 | 94 | 71.2 | 61 | 46.2 | 2.4 |
| Online instructional materials | 68 | 51.5 | 86 | 65.2 | 66 | 50 | 73 | 55.3 | 2.22 |
| Case studies | 99 | 75 | 99 | 75 | 52 | 39.4 | 17 | 12.9 | 2.02 |
| Facebook | 102 | 77.3 | 76 | 57.6 | 47 | 35.6 | 39 | 29.5 | 2.00 |
| Internet links | 54 | 40.9 | 120 | 90.9 | 70 | 53 | 17 | 12.9 | 1.98 |
| Threaded discussions | 94 | 71.2 | 67 | 50.8 | 53 | 40.2 | 40 | 30.3 | 1.92 |
| Instant messaging | 39 | 29.5 | 43 | 32.6 | 97 | 79.5 | 72 | 54.5 | 1.89 |
| Email | 79 | 59.8 | 99 | 75 | 38 | 28.8 | 28 | 21.2 | 1.85 |
| Online tutorials | 28 | 21.2 | 32 | 24.2 | 109 | 82.6 | 65 | 49.2 | 1.77 |
| Support materials | 37 | 28 | 56 | 42.4 | 104 | 78.8 | 35 | 26.5 | 1.76 |
| PowerPoint | 32 | 24.2 | 74 | 56.1 | 92 | 69.7 | 32 | 24.2 | 1.74 |
| Instructor announcements | 33 | 25 | 60 | 45.5 | 60 | 45.5 | 75 | 56.8 | 1.73 |
| Blogging | 68 | 51.5 | 71 | 53.8 | 58 | 43.9 | 30 | 22.7 | 1.72 |
| Text | 37 | 28 | 44 | 33.3 | 106 | 80.3 | 37 | 28 | 1.7 |
| Online editing and feedback | 103 | 78 | 75 | 56.8 | 21 | 15.9 | 24 | 18.2 | 1.69 |
| Role play/simulations | 78 | 59.1 | 62 | 47 | 58 | 43.9 | 17 | 12.9 | 1.63 |
| Online Chat | 33 | 25 | 85 | 64.4 | 56 | 42.4 | 35 | 26.5 | 1.58 |

Table 15 Continued

| | With other Learner | | With the Instructor | | With the Content | | With the Technology | | Mean Selection Across Variables |
|---|---|---|---|---|---|---|---|---|---|
| | *f* | % | *f* | % | *f* | % | *f* | % | *M* |
| Voice over PowerPoint | 22 | 16.7 | 59 | 44.7 | 84 | 63.6 | 44 | 33.3 | 1.58 |
| Interactive video conference | 79 | 59.8 | 70 | 53 | 30 | 22.7 | 28 | 21.2 | 1.57 |
| Online calendar | 15 | 11.4 | 39 | 29.5 | 86 | 65.2 | 67 | 50.8 | 1.57 |
| Guest lectures | 38 | 28.8 | 93 | 70.5 | 66 | 50 | 9 | 6.8 | 1.56 |
| Short online video | 23 | 17.4 | 36 | 27.3 | 94 | 71.2 | 52 | 39.4 | 1.55 |
| Online quizzes | 95 | 72 | 65 | 49.2 | 19 | 14.4 | 21 | 15.9 | 1.52 |
| Worksheets | 32 | 24.2 | 58 | 43.9 | 81 | 61.4 | 22 | 16.7 | 1.46 |
| Audio/ phone call | 91 | 68.9 | 70 | 53 | 15 | 11.4 | 9 | 6.8 | 1.4 |
| Getting help online | 17 | 12.9 | 25 | 18.9 | 60 | 45.5 | 73 | 55.3 | 1.33 |
| Plurk | 71 | 53.8 | 48 | 36.4 | 18 | 13.6 | 21 | 15.9 | 1.2 |
| Twitter | 65 | 49.2 | 50 | 37.9 | 21 | 15.9 | 18 | 13.6 | 1.17 |
| Lecture | 18 | 13.6 | 25 | 18.9 | 40 | 30.3 | 68 | 51.5 | 1.14 |

**Objective Eight: Predict Satisfaction, Quality, and Learning from Interactions**

The objective of this section is using stepwise linear regression to predict satisfaction from the constructs of the learner to learner interaction, learner to instructor interaction, learner to the course content interaction, and learner to the course technology interaction. Table 16 shows the regression model that the learner to the course content interaction is a significant predictor of satisfaction.

Table 16

*Stepwise Regression of Predictors for Satisfaction from Interactions*

| Construct | | | *R* | $R^2$ | *B* | *Beta* | *t-value* | *Sig.* |
|---|---|---|---|---|---|---|---|---|
| Satisfaction | Model 1 | learn to the course content | .296[a] | .088 | .217 | .296 | 3.539 | .001 |
| | | (Constant) | | | .940 | | 3.938 | .001 |

a. Predictors: (Constant), learn to the course content

The objective of this section is using stepwise linear regression to predict quality from the constructs of the learner to learner interaction, learner to instructor interaction, learner to the course content interaction, and learner to the course technology interaction. Table 17 shows the regression model that the learner to the course content interactions and learner to the instructor interactions are significant predictors of quality.

Table 17

*Stepwise Regression of Predictors for Quality from Interactions*

| Construct | | | *R* | $R^2$ | *B* | *Beta* | *t-value* | *Sig.* |
|---|---|---|---|---|---|---|---|---|
| Quality | Model 1 | learn to the course content | .336[a] | .11 | .152 | .336 | 4.07 | .001 |
| | | (Constant) | | | 1.33 | | 9.10 | .001 |
| | Model 2 | learn to the course content | .373[b] | .13 | .110 | .244 | 2.60 | .010 |
| | | learner to instructor | | | .076 | .187 | 1.99 | .049 |
| | | (Constant) | | | 1.22 | | 8.02 | .001 |

a. Predictors: (Constant), learn to the course content
b. Predictors: (Constant), learn to the course content, learner to instructor

The objective of this section is using stepwise linear regression to predict learning from the constructs of the learner to learner interaction, learner to instructor interaction, learner to the course content interaction, and learner to the course technology interaction. Table 18 shows the regression model that the learner to the course technology interaction and learner to the instructor interaction are significant predictors of learning.

Table 18

*Stepwise Regression of Predictors for Learning from Interactions*

| Construct | | | *R* | $R^2$ | *B* | *Beta* | *t-value* | *Sig.* |
|---|---|---|---|---|---|---|---|---|
| Learning | Model 1 | learn to the technology | .370[a] | .137 | .175 | .370 | 4.536 | .001 |
| | | (Constant) | | | 1.173 | | 7.834 | .001 |
| | Model 2 | learn to the technology | .428[b] | .184 | .134 | .284 | 3.317 | .001 |
| | | learner to instructor | | | .115 | .233 | 2.722 | .007 |
| | | (Constant) | | | .932 | | 5.452 | .001 |

a. Predictors: (Constant), learn to the course technology
b. Predictors: (Constant), learn to the course technology, learner to instructor

The objective of this section is using stepwise linear regression to predict enhanced interaction from the constructs of the learner to learner interaction, learner to instructor interaction, learner to the course content interaction, and learner to the course technology interaction. Table 19 shows the regression model that learner to the course content interaction and learner to instructor interaction are significant predictors of enhanced interaction.

Table 19

*Stepwise Regression of Predictors for Enhancement Interactions*

| Construct | | | *R* | $R^2$ | *B* | *Beta* | *t-value* | *Sig.* |
|---|---|---|---|---|---|---|---|---|
| Enhanced interaction | Model 1 | learn to the content | .398[a] | .159 | .183 | .398 | 4.951 | .001 |
| | | (Constant) | | | 1.137 | | 7.889 | .001 |
| | Model 2 | learn to the content | .449[b] | .202 | .129 | .281 | 3.111 | .002 |
| | | learner to instructor | | | .098 | .238 | 2.632 | .010 |
| | | (Constant) | | | 1.006 | | 6.732 | .001 |

a. Predictors: (Constant), learn to the course content
b. Predictors: (Constant), learn to the course content, learner to instructor

**Objective Nine: Comparison of Results to Former Study**

This study duplicated from the doctor dissertation "Vicarious interactions and self-direct learning of students by course delivery strategy" (Seidel, 2012). Seidel (2012) and this study use the same instrument to understand students' perceptions and attitudes toward the relationship between interactions and technologies when taking distance classes. Based on the using habits of technologies of Taiwanese, this study changes some technology items. Because some technology items in the instrument are not familiar to the populations in Taiwan, this study changes those unfamiliar technology items for the same function but much common use programs. The population of this study is undergraduate and graduate students in National Chung-Hsing University (NCHU), in Taiwan. However, the population of Seidel's (2012) research is graduated students of Texas A&M University (TAMU), in America. Because both population are differing

from each other, there are some similar and contrast in findings. Table 20 is the comparison of results and details of differences for both researches' findings.

Online chats, email, audio/phone call, social sites (Ex: Facebook), interactive video conferencing, instant messaging, blogging, and collaborative documents are some examples of technologies to enhance the learner to other learners interaction. In this part, there is no similarity of technology in two researches to enhance learner to learner interaction (see Table 20).

Lecture, streaming video, email, voice over power points, online editing and feedback, audio/phone call, evaluation are some examples of technologies to enhance the learner to the instructor interaction. From the Table 20, both researches point out that lecture and online editing and feedback are effective technologies, and evaluation is the less effective tools to enhance the interactions between learners and instructors. There are some similarities of the usage of media to enhance the learner to the instructor interaction in U.S.A. and Taiwan.

Text, online instructional, materials worksheets, support materials, worksheets, case studies, power points, interactive video, online exercises, podcasting, and collaborative document are some examples of technologies to enhance the learner to the course content interaction. From the Table 20, both researches point out that support materials are effective technologies to enhance the learner to the course content interaction.

Online tutorials, getting help online, online instructions for downloading plugins, electronic libraries, software applications, a file management system, search engines are

some examples of technologies to enhance the learner to the course technology interaction. According to the Table 20, there is no similarity of technology in two researches to enhance learner to the course technology interaction.

Table 20

*Comparison of Results of Transactional Distance Theory with Former Studies*

| Seidel (2012) | This Study |
|---|---|
| **Section I: Learner to Learner interactions** | |
| < *effective technologies*><br>• Interactive video conferencing<br>• Online chats<br>• Email<br><br>< *less effective technologies* ><br>• Blogging | < *effective technologies*><br>• Collaborative documents<br>• Social sites<br>• Audio/phone call<br><br>< *less effective technologies* ><br>• email<br>• Online chats |
| **Section II: Learner to Instructor interactions** | |
| < *effective technologies*><br>• Lecture<br>• Email<br>• Online editing and feedback<br>• Voice over PowerPoint<br><br>< *less effective technologies* ><br>• Evaluation | < *effective technologies*><br>• Lecture<br>• Audio/phone call<br>• Online editing and feedback<br><br>< *less effective technologies* ><br>• Evaluation |

Table 20 Continued

| Seidel (2012) | This Study |
|---|---|
| **Section III: Learner to the course content interactions** | |
| < *effective technologies*><br>• Online exercises<br>• Online instructional materials<br>• Support materials<br><br>< *less effective technologies* ><br>• Texts | < *effective technologies*><br>• Case studies<br>• Collaborative documents<br>• Support material<br><br>< *less effective technologies* ><br>• Online exercise<br>• Worksheets |
| **Section IV: Learner to the course technology interactions** | |
| < *effective technologies*><br>• Electronic libraries<br>• Getting online help<br>• Online tutorials<br><br>< *less effective technologies* ><br>• A file management system<br>• Instructions for downloading plugins | < *effective technologies*><br>• Electronic libraries<br>• Search engines<br>• Software applications<br><br>< *less effective technologies* ><br>• Online tutorials<br>• Getting online help |

Table 21 and Table 22 show results of both research for the question "is the use of the following technology (around 30 technologies choice) an effective means for enhancing interactions with other learners, the instructor, the course technology, or the course content?" Each participant based on their experiences chooses multiple answers for each given technology.

Table 21 is the results of comparison of enhancement technologies interaction with other learners and the instructor. Both two researches point out that email is the effective technology of all the given technologies to increase the learners to the instructor interaction (see table 21). There are no other similar results for the answers of

appropriate technologies to enhance interactions between learners to learners and learners to instructor.

Dooley et al., (2005) suggested that online chats, threaded discussion, e-mail, point-to-point video conference, and audio calls are some good example to enhance learner to learner interaction. Lecture, email, online editing and feedback, evaluation of learning, interactive television, streaming video, voice- over Power Points are some good example to enhance learner to instructor interaction (Dooley et al., 2005). From the Seidel (2012) findings, participants have an agreement that online chat, threaded discussion, and audio/ phone call are the most three effective technologies of all given technologies to enhance the learner to learner interaction and those three technologies are also match good examples to increase learner to learner interaction. On the other hand, for this study, the most three effective technologies of all given technologies to enhance the learner to learner interaction are Facebook, case studies, and online quizzes, but none of them matches the list of good examples.

Compare the results of technologies for enhance learner to instructor interaction. Table 21 shows the most effective technologies that same as good examples of technologies to enhance learner to instructor interactions (Dooley et al., 2005) are email and lecture in Seidel (2012), and is email in this study.

Table 21

*Comparison of Enhancement Technologies Interaction with Other Learners and with the Instructor*

| | **Section VI: Technologies** | |
|---|---|---|
| | Seidel (2012) | This Study |
| **With other learners** | < effective technologies><br>• online chat<br>• threaded discussion<br>• audio/phone calls<br>< less effective technologies ><br>• downloading plugins<br>• online glossaries<br>• Software applications | < effective technologies><br>• online editing and feedback<br>• Facebook<br>• case studies<br>< less effective technologies ><br>• lecture<br>• getting help online<br>• online calendar |
| **with the instructor** | < effective technologies><br>• email<br>• lecture<br>• Instructor announcements<br>< less effective technologies ><br>• software applications<br>• online glossaries<br>• twitter | < effective technologies><br>• email<br>• internet links<br>• case studies<br>• guest lectures<br>< less effective technologies ><br>• short online video<br>• online tutorials<br>• getting help online<br>• lecture |

Table 22 is a comparison of Seidel (2012) and this study in effective and less effective enhancement technologies from 30 given technologies for interactions of learners to the course content and learners to the course technology. From the Table 22, both researches agree that Twitter is the less effective technology to enhance the learners to the course content interaction, and guest lecture is the less effective technology to increase learners to the course technology interaction. There is no any other similar technology for enhancing learner to the course content interaction and learner to the course technology interaction in both two researches.

Dooley et al., (2005) suggested that good examples of technology for enhancing learner to the course content interaction are online instructional materials, support materials, worksheets, and case studies. Good examples of technology for enhance the learner to the course technology interaction are online tutorials, getting help online, online instructions for downloading plugins, installing software electronic libraries, software applications, and file management system (Dooley et al., 2005). From the Seidel (2012) findings, participants have highly agreement that online instructional materials, case studies, and support materials are the most effective technologies of all given technologies to enhance the learner to the course content interaction and those three technologies also match good examples to increase learner to learner interaction. On the other hand, in this study, the most effective technologies of all given technologies to enhance the learner to the course content interaction of this research are text, support materials, and instant messaging, and only support materials match the list of good examples.

Technologies for enhancing learner to the course technology interaction, downloading plugins and electronic are effective technologies and the same as good examples of Dooley et al., (2005) in Seidel (2012). In this study, instructor announcements, online instructional materials, getting help online, and instant messaging are effective technologies for enhancing learner to the course technology interaction. Only getting help online is the same as the good examples.

Table 22

*Comparison of Enhancement Technologies Interaction with the Course Content and with the Course Technology*

| | **Section VI: Technologies** | |
|---|---|---|
| | Seidel (2012) | This Study |
| **With the course content** | < effective technologies><br>• online instructional materials<br>• online glossaries<br>• support materials<br>• case studies<br><br>< less effective technologies ><br>• twitter<br>• online feature<br>• text messaging<br>• student homepages | < effective technologies><br>• online tutorials<br>• text<br>• support materials<br>• instant messaing<br><br>< less effective technologies ><br>• twitter<br>• online editing and feedback<br>• online quizzes<br>• plurk<br>• audio/phone call |

Table 22 Continued

| | **Section VI: Technologies** | |
|---|---|---|
| | Seidel (2012) | This Study |
| **With the course technology** | < effective technologies><br><br>• downloading plugins<br>• software applications<br>• electronic libraries<br><br>< less effective technologies ><br><br>• guest lectures<br>• role play/ simulations<br>• social sites | < effective technologies><br><br>• instructor announcements<br>• getting help online<br>• online instructional materials<br>• instant messaging<br><br>< less effective technologies ><br><br>• guest lectures<br>• audio/phone call |

# CHAPTER V

# CONCLUSION, IMPLICATIONS, RECOMMENDATIONS

## Purpose of Study

The purpose of this study was to describe how maximizing interactions in a distance course impact the quality of instruction, student leanings, and satisfaction with the course. This study, further describe how interaction can be enhanced with certain technologies.

## Objectives

The objectives of this study were to:

1. Describe learner to learner interactions of online class.
2. Describe learner to the instructor interactions of online class.
3. Describe learner to the course content interactions of online class.
4. Describe learner to the course technology interactions of online class.
5. Describe satisfaction, quality, and learning of online class.
6. Describe technologies used to enhance interactions
7. Describe and explore the relationship among interactions, technologies and personal characteristics.
8. Compare Results of transactional distance theory with former studies.

## Summary of Review of Literature

**Distance learning.** Distance learning education is a teaching process to deliver knowledge by using multiple media to break limitations of space and time (Moore, 1989). It is a new form of education method by focusing on the computer and web-based instruction (Carr-Chellman & Duchastel, 2000). Besides, distant learning environment not only provide multiple learning channels and diversity methods, but also enhance the teaching qualities, academic exchanges, and information sharing. However, lack of social interaction is one of the main barriers to learners taking online courses (Lin & Berge, 2005). Also, there are many elements may influence the interaction of online course such as structure, class size, feedback provided to the students, and participants' prior experience with computer-mediated communication (CMC) setting (Vrasidas & McIsaac, 1999, p. 27-29).

Volery and Lord (2000, p. 217-219) point out that there are three main factors may influence the effectiveness of online learning: technology, instructor characteristics, and student characteristics. In addition, course design, learner motivation, time management, and comfortable with online technologies are important elements for learner having successful online learning experiences (Song, Singleton, Hill, & Koh, 2004, p. 65).

**Transactional distance theory.** "The whole point and purpose of distance education theory is to summarize the different relationships and strength of relationship among and between these variables that make up transactional distance, especially the behaviors of teachers and learners (Moore, 1989, P.23)".

The details of Moore's transactional distance theory model which created by Moore (1989) and Hillman et al., (1994) including four types of interaction: (1) Learners to learners—How peer interactions impact learning such as share information, discuss or chat. (2) Learners to instructors—How to improve the interaction between learners and instructors by using some technologies such as lecture, e-mail, online editing and feedback, or evaluation. (3) Learners to content—What kinds of materials are more attract people in learning such as using online books, online instructional material, or support materials. (4) Learners to technology—How technology help student in learning such as using online tutorials, getting help online, file management (Dooley et al., 2005).

**The development of online learning systems in Taiwan.** Most of instructors in universities, in Taiwan still use traditional teaching ways to deliver learning content. There are only few universities which have communication, technological, media related departments using creative learning methods for teaching in Taiwan. Hence, most of students in Taiwan have fewer opportunities to take distance class or learn through computer and internet.

There are two main reasons that difficult to develop on-line courses and distance educations in Taiwan. The two problems are that instructors are lack of abilities to control and combine multiple media to support teaching, and students are lack of channels and equipment to access online courses (Chen, 2001). Hence, even the idea of online education is not new in Taiwan there still have problems to develop online classes as a new learning method. However, from the record of internet using survey, there are more than 90% of students who are studying in senior high schools or college using

internet for diverse purposes activities such as communication tools, searching engines, and other internet tools every day in Taiwan (Chu, 1999; Lin, 2007). It means that most of students in Taiwan are familiar with the usage of computer and internet. To sum up, it is possible to promote distance classes and online learning in Taiwan when there have well-constructed courses and learning contents provided without technical using problems.

**Statement of Problems**

There are some online classes provided for students in Taiwan now. However, only few students have experiences about taking classes online. The biggest reason is because the concept of online learning is still new in Taiwan. Besides, due to poor course design, inappropriate technology using, and lack of professional online teaching instructors, Taiwanese students tended to take a face-to-face class than an online course if they can choose (Ku & Lohr, 2003; Wang & Reeves, 2007). Moreover, Frankola (2000) and Wang and Reeves (2007) said that technology problems and lack of interactions in online classes are two important factors for learners failure in taking classes online or drop out online classes.

Moore (1989) and Hillman, Wills, and Gunawardena (1994) present transactional distance theory that four interactions in online learning environments and usage of technologies are influential factors for learners' engagement and satisfaction in online learning. Effective using technologies and great interactions may key points for learners have successful learning outcomes in online courses.

Hence, the main ideas of this research are using Moore's (1989) transactional distance theory to find the relationship between transactional distance theory and technologies to understand learners' perceptions of satisfaction, quality and student learning of online learning. Also, explore the influences of technologies in online learning classes to enhance interactions in online courses.

**Summary of Methodology**

The questions in Section I created to judge the level of interaction between the learner and other learners through the use of distance education systems and media. The questions in Section II created to judge the level of interaction between the learner and the instructor. The questions in Section III created to judge the level of interaction between the learner and course content. The questions in Section IV created to judge the level of interaction between the learner and course technology. The questions in Section V created to judge the level of perceived satisfaction, quality, and learning when interactions provided in online courses.

The items in Section VI created to judge the level of agreement with the question. "Is the use of the following technology an effective means for enhancing interactions with other learners, the instructor, the course technology, or the course content?" The participants were able to choose multiple answers for each given technology.

The instrument Data of this descriptive and correlational study collected with a questionnaire (see Appendix A-2) distributed via Qualtrics to the populations in NCHU, in Taiwan. An analysis of the data described below using SPSS 20.0. It is an anonymous

survey that participants just receive the survey web address from email or academic platforms of departments. There is also no any identification information for each participant on questionnaire.

**Summary of key Findings for Each Objective**

The total number of the population is 132 students who major in agricultural related departments in National Chung-Hsing University (NCHU), in Taiwan. For twelve departments, most of participants from department of Agronomy, Animal Science, and Horticulture, and only department of Applied Economics and Graduate Institute of Bio-Industry Management have no participants. The reason that different number participants of each department is because some of department offices are highly encouraged students involving in this research but some of them are not. Hence, two departments have no participants involving in and some of departments have low number of participants.

In the beginning of this research, participants have to answer their favorite learning methods which including using iPhone/smart phone, computer, and textbook. Most students prefer to use computer ($f$ = 66, 60.6%) as their main learning method, textbooks ($f$ = 40, 36.7%) are the second favorite one for learning, and iPhone/smart phone ($f$ = 3, 2.8%) is not a popular learning tool for students in Taiwan. It is a single choice question, but according to the data that there are 23 of all 132 participants have multiple choice of this question. Based on the above results, computer is an important tool for students in learning.

**Objective one: Learner to learner interaction.** Dooley, et al., 2005 suggested that examples of technology for enhance learner to learner interaction are online chats, threaded discussion, e-mail, point-to-point video conference, and audio. In section I, describe learner to learner interactions of online class. Overall ($M$ = 3.61, $SD$ = 0.89) students tended to agree that distance education technologies could be used to increase learner to learner interactions.

34.1% of participants strong agreed and 47% of participants agreed that collaborative documents enhanced learner to learner interactions. 21.2% of participants strong agreed and 53% of participants agreed that social sites such as Facebook enhanced learner to learner interactions. 12.9% of participants strong agreed and 38.6% of participants agreed that audio/phone call enhanced learner to learner interactions. On the other hand, only 6.1% of participants strong agreed and 47.7% of participants agreed that email enhanced learner to learner interactions. Besides, only 6.1% of participants strong agreed and 42.4% of participants agreed that online chats enhanced learner to learner interactions.

To sum up, the usage of collaborative documents, social sites, and audio/phone call may enhancing the interaction between learners with other learners. However, the usages of online chats and email have less effective to enhance the interaction between learners and other learners.

The results suggest that the usage of collaborative documents, social sites, and audio/phone call may enhance the interaction between learners and other learners. The results also suggest that instructors should evaluate the value of online chats and email in

the educational setting. Instructors have to think about the usage of the above technologies to create a helpful and appropriate teaching setting.

**Objective two: Learner to instructor interaction.** Dooley, et al., 2005 suggested that examples of technology for enhance learner to the instructor interaction are lecture, email, online editing and feedback, evaluation of learning, interactive television, streaming video, voice- over Power Points. In section II, overall ($M$ = 3.46, $SD$ = 0.48) students tended to agree that distance education technologies could be used to increase learner to the instructor interactions.

24.2% of participants strong agreed and 50% of participants agreed that lecture enhanced learner to the instructor interactions. 12.1% of participants strong agreed and 51.5% of participants agreed that online editing and feedback enhanced learner to the instructor interactions. 12.1% of participants strong agreed and 34.1% of participants agreed that audio/phone call enhanced learner to the instructor interactions. On the other hand, only 8.3% of participants strong agreed and 42.4% of participants agreed that streaming video enhanced learner to the instructor interactions. Besides, only 3% of participants strong agreed and 14.4% of participants agreed that evaluation enhanced learner to the instructor interactions.

To sum up, the usage of lecture, online editing and feedback, and audio/phone call may enhance the interaction between learners with the instructor. However, the usages of evaluation and streaming video have less effective to enhance the interaction between learners and the instructor.

The results suggest that the usage of lecture, online editing and feedback, and email may increase the interaction between learners and the instructor. The results also suggest that instructors should evaluate the value of evaluation and streaming video in the educational setting. Instructors have to think about the usage of the above technologies to create a helpful and appropriate teaching setting.

**Objective three: Learner to the course content interaction.** Dooley, et al., 2005 suggested that examples of technology for enhance learner to the course content interaction are online instructional materials, support materials, worksheets, and case studies. In section III, overall ($M$ = 3.88, $SD$ = 0.43) students tended to agree that distance education technologies could be used to increase learner to the course content interactions.

22.7% of participants strong agreed and 64.4% of participants agreed that case studies enhanced learner to the course content interactions. 20.5% of participants strong agreed and 60.6% of participants agreed that collaborative documents enhanced learner to the course content interactions. 18.9% of participants strong agreed and 56.8% of participants agreed that Power Points enhanced learner to the course content interactions. On the other hand, only 9.8% of participants strong agreed and 60.6% of participants agreed that online exercise enhanced learner to the course content interactions. Besides, only 6.8% of participants strong agreed and 53% of participants agreed that worksheets enhanced learner to the course content interactions.

To sum up, the usage of case studies, collaborative documents, and support materials may enhance the interaction between learners with the course content.

However, the usages of online exercise and worksheets have less effective to enhance the interaction between learners and the course content.

The results suggest that the usage of case studies, collaborative documents, and support materials may enhance the interaction between learners with the course content. The results also suggest that instructors should evaluate the value of online exercise and worksheets in the educational setting. Instructors have to think about the usage of the above technologies to create a helpful and appropriate teaching setting.

**Objective four: Learner to the course technology interaction.** Dooley, et al., (2005) suggested that examples of technology for enhance the learner to the course technology interaction are online tutorials, getting help online, online instructions for downloading plugins, installing software electronic libraries, software applications, and file management system. In section IV, overall ($M$ = 3.85, $SD$ = 0.5) students tended to agree that distance education technologies could be used to increase learner to the course technology interactions.

43.2% of participants strong agreed and 44.7% of participants agreed that search engines enhanced learner to the course technology interactions. 25.8% of participants strong agreed and 53% of participants agreed that electronic libraries enhanced learner to the course technology interactions. 18.9% of participants strong agreed and 47% of participants agreed that software applications enhanced learner to the course technology interactions. On the other hand, only 9.8% of participants strong agreed and 55.3% of participants agreed that online tutorials enhanced learner to the course technology

interactions. Besides, only 8.3% of participants strong agreed and 50.8% of participants agreed that getting help online enhanced learner to the course technology interactions.

To sum up, the usage of search engines, electronic libraries, and electronic libraries may enhance the interaction between learners with the course technology. However, the usages of online tutorials and getting help online have less effective to enhance the interaction between learners and the course technology.

The results suggest that the usage of search engines, electronic libraries, and software applications may enhance the interaction between learners with the course technology. The results also suggest that instructors should evaluate the value of online tutorials and getting help online in the educational setting. Instructors have to think about the usage of the above technologies to create a helpful and appropriate teaching setting.

**Objective five: Satisfaction, quality, and learning.** Interpersonal or social interactions such as the learner to learner interaction and learners to the instructor interaction may affect learners' satisfaction and frequency of interaction in Web-based instruction (Jung, Choi, Lim, & Leem, 2002). 87.9% participants agree that they perceive great satisfaction in online courses when the learner to learner interactions provided. 80.3% participants agree that they perceive greater satisfaction in online courses when the learner to the instructor interactions provided. 76.5% participants agree that they perceive greater satisfaction in online courses when the learner to the course technology interactions provided. 67.4% participants agree that they perceive greater satisfaction in online courses when the learner to the course content interactions

provided. Participants tended agree ($M$ = 1.78, $SD$ = 0.31) that when there are some opportunities of interactions provided with other learners, with the instructor, with the course content, and with the course technology, they might have higher satisfaction in online learning.

Providing effective interaction between learners to learners and learner to instructors could increase and maintain high course quality by increasing the opportunities of interactions, and improving the time-management to give feedback and response to students on time (Seidel, 2012). 97.7% participants agree that they get better quality of online courses when the learner to the instructor interactions provided. 96.2% participants agree that they get better quality of online courses when the learner to learner interactions provided. 91.7% participants agree that they get better quality of online courses when the learner to the course technology interactions provided. 79.5% participants agree that they get better quality of online courses when the learner to the course content interactions provided. Participants tended agree ($M$ = 1.91, $SD$ = 0.19) that when there are some opportunities of interactions provided with other learners, with the instructor, with the course content, and with the course technology, those interactions will enhance the quality of online courses during the learning process.

For adult learners, learners to the instructor interaction and learner to learner interaction are a crucial part to enhance learning and participation in online learning activities (Jung, Choi, Lim, & Leem, 2002). 95.5% participants agree that they perceive increased learning when the learner to learner interactions provided. 93.2% participants agree that they perceive increased learning when the learner to the instructor interactions

provided. 83.3% participants agree that they perceive increased learning when the learner to the course technology interactions provided. 66.7% participants agree that they perceive increased learning when the learner to the course content interactions provided. Participants tended agree ($M$ = 1.85, $SD$ = 0.23) that when there are some opportunities of interactions provided with other learners, with the instructor, with the course content, and with the course technology, those interactions increasing participants' desire in learning.

Based on the results, participants think that they have better satisfaction, quality, and learning when the interactions with other learners and with the instructor provided. It also means that learner to learner interactions and learners to the instructor interaction could be considerable factors for enhancing satisfaction, quality, and learning of learners. On the other hand, learner to the course content interaction and learner to the course technology interaction are less important factor to enhance satisfaction, quality, and learning for learners.

Online chats, threaded discussion, e-mail, point-to-point video conference, audio calls, lecture, online editing and feedback, evaluation of learning, interactive television, streaming video, and voice- over Power Points are some suggested and considered tools for putting into course design, enhancing interactions for the learner to learner, and learner to the instructor, and increasing satisfaction, quality, and learning. Instructors are recommended considering about the above technologies or other media for course design.

**Objective six: Describe the data using Pearson correlation coefficient.** The overall enhanced interaction mean score had a very strong correlation ($r$ = .78) with the learning mean, a very strong correlation ($r$ = .79) with the satisfaction mean, a very strong correlation ($r$ = .81) with quality mean, a low correlation ($r$ = .20) with the learner to learner mean, a moderate correlation ($r$ = .38) with the learner to instructor mean, a moderate correlation ($r$ = .40) with the learner to the course content mean, and a moderate correlation ($r$ = .35) with the learner to the course technology mean.

The overall learner to the course technology mean score had a moderate correlation ($r$ = .37) with the learning mean, a low correlation ($r$ = .24) with the satisfaction mean, a low correlation ($r$ = .21) with quality mean, a moderate correlation ($r$ = .34) with the learner to learner mean, a moderate correlation ($r$ = .37) with the learner to instructor mean, and a substantial correlation ($r$ = .57) with the learner to the course content mean. The overall the learner to the course content mean score had a moderate correlation ($r$ = .33) with the learning mean, a moderate correlation ($r$ = .30) with the satisfaction mean, a moderate correlation ($r$ = .34) with quality mean, a low correlation ($r$ = .29) with the learner to learner mean, and a moderate correlation ($r$ = .49) with the learner to instructor mean. The overall learner to instructor mean score had a moderate correlation ($r$ = .34) with the learning mean, a low correlation ($r$ = .27) with the satisfaction mean, a moderate correlation ($r$ = .31) with quality mean, and a moderate correlation ($r$=.40) with the satisfaction mean. The overall quality mean score had a substantial correlation ($r$ = .66) with the learning mean and a moderate correlation ($r$ = .42) with the satisfaction mean. The overall satisfaction mean score had a moderate

correlation ($r$ = .32) with the learning mean. The overall learner to learner mean score had a low correlation ($r$ = .18) with the quality mean.

From the above results, we can assume that there are significant correlations between interactions of the learner to learner, learner to instructor, learner to the course content, and learner to the course technology.

Among satisfaction, quality, and learning, it is the strongest correlation between quality mean and learning mean ($r$ = .66). It means that it interrelated between quality and learning. To sum up, learners can gain increased level of quality when learning also in an increase level and vice versa.

Among learner to learner interaction, learner to the instructor interaction, learner to the course content interaction, and learner to the course technology interaction, it is the strongest correlation between leaner to the course technology interaction mean and learner to the course content interaction mean ($r$ = .57). It means that it interrelated between leaner to the course technology interaction and learner to the course content interaction. To sum up, both leaner to the course technology interaction and learner to the course content are important.

From above results, it is the strongest correlation ($r$ = .81) between the enhanced interaction mean and quality mean of all means. It means that it interrelated between enhanced interaction and quality. As a result, the quality may a crucial element enhance interactions. To sum up, instructors improve the level of quality can also increase enhanced interaction and vice versa.

**Objective seven: Describe the learners' perception of effectiveness of different technologies at enhancing interaction.** The most useful technologies for improving the interaction with other students are online editing and feedback (*f* = 103, 78%), Facebook (*f* = 102, 77.3%), case studies (*f* = 99, 75%), and online quizzes (*f* = 95, 72%). Lecture (*f* = 18, 13.6%), getting help online (*f* = 17, 12.9%), and online calendar (*f* = 15, 11.4%) are the less effective tools to enhance the interaction with other students.

From the results, online editing and feedback, Facebook, case studies, and online quizzes are effective technologies for instructors enhancing learner to learner interaction. Also, lecture, getting help online, and online calendar are the less effective technologies to instructors for enhancing the interaction with other learners.

The most useful tools to increase the interaction with the instructor are case studies (*f* = 99, 75%), Email (*f* = 99, 75%), and guest lectures (*f* = 93, 70.5%). On the other hand, three of the less effective tools for interaction with the instructor are short online video (*f* = 36, 27.3%), online tutorials (*f* = 32, 24.2%), getting help online (*f* = 25, 18.9%), and lecture (*f* = 25, 18.9%).

From the results, case study, email, and guest lectures are effective technologies for instructors enhancing learners to the instructor interaction. Also, short online video, online tutorials, getting help online, and lecture are the less effective technologies to instructor for enhancing the interaction between learners to the instructor.

Online tutorials (*f* = 109, 82.6%), text (*f* = 106, 80.3%), support materials (*f* = 104, 78.8), and instant messaging (*f* = 97, 79.5%) are the most effective technologies to enhance the interaction with the course content. On the other hand, online editing and

feedback ($f$ = 21, 15.9%), Twitter ($f$ = 21, 15.9%), online quizzes ($f$ = 19, 14.4%), Plurk ($f$ = 18, 13.6%), and audio/ phone call ($f$ = 15, 11.4%) have fewer influences to enhance the interaction with the course content.

From the results, online tutorials, text, support materials, and instant messaging are effective technologies for instructors enhancing learner to the course content interaction. Also, online editing and feedback, Twitter, online quizzes, Plurk, and audio/ phone call are the less effective technologies to instructor for enhancing the interaction between learners with the course content. Instructor announcements ($f$ = 75, 56.8%), getting help online ($f$ = 73, 55.3%), online instructional materials ($f$ = 73, 55.3%), and instant messaging ($f$ = 72, 54.5%) are useful technologies for enhance the learner to the course technology interaction. On the other hand, audio/ phone call ($f$ = 9, 6.8%), guest lectures ($f$ = 9, 6.8%), role play/simulations ($f$ = 17, 12.9%), internet links ($f$ = 17, 12.9%), and case studies ($f$ = 17, 12.9%) have less influence to enhance interaction with the course technology.

From the results, instructor announcements, getting help online, online instructional materials, and instant messaging are effective technologies for instructors enhancing learner to the course technology interaction. Also, audio/ phone call, guest lectures, role play/simulations, internet links, and case studies are the less effective technologies to instructor for enhancing the interaction between learners to the course technology.

Collaborative documents ($M$ = 2.4), online instructional materials ($M$ = 2.22), case studies ($M$ = 2.02), Facebook ($M$ = 2), and internet links ($M$ = 1.98) are the most

useful technologies to enhance interactions. On the other hand, getting help online ($M$ = 1.33), Plurk ($M$ = 1.2), Twitter ($M$ = 1.17), and lecture ($M$ = 1.14) have less influence to enhance interactions.

For instructors, collaborative documents, online instructional materials, case studies, Facebook, and internet links are effective technologies to enhance overall interactions. On the other hand, instructors have to value and careful not to use getting help online, Plurk, Twitter, and lecture to enhance overall interactions.

**Objective eight: Predict satisfaction, quality, and learning from interaction.** The regression models point out that learner to the course content interaction is a significant predictor of satisfaction. Learner to the course content interaction and learner to instructor interaction are significant predictors of quality. Learner to the course technology interaction and learner to instructor interaction are significant predictors of learning. Learner to the course content interaction and learner to instructor interaction are significant predictors of enhanced interaction. According to Dooley et al., (2005), learners can perceive the maximize desire in learning and satisfaction when learner to learner interaction, learner to the instructor interaction, learner to the course content interaction, and learner to the course technology interaction occurred and overlapping. Hence, the results of this thesis do not meet their hypothesis.

Learner to the course content interaction, learner to the instructor interaction, and learner to the course technology interaction are good predictors of satisfaction, quality, and learning. To sum up, effective using learner to the course content interaction, learner

to the instructor interaction, and learner to the course technology interaction could increase the perception of satisfaction, quality, and learning.

From the results of regressions to predict learners' satisfaction, quality, learning and enhanced interaction toward online learning, the relationships between four types of interactions and satisfaction, quality, and learning are shown in Figure 2. It's obvious that learner to the course content interaction is the most important factor of all four kinds of interactions to predict learners' satisfaction, quality, and enhanced interactions of online learning. The learner to the instructor interaction is the second important interactions to predict learning, quality, and enhanced interactions of online learning. On the other hand, there is less relationship that learner to learner interaction could be a good predictor for learners' satisfaction, quality, and learning of online learning. Comparing to the Moore's (1989) transactional distance theory, the findings of this research are not support by the transactional distance theory (see Figure 2). To sum up, delivery methods does not matter as much as delivery strategies. Besides, culture differences, experiences of online learning, majors, and known of technologies may reasons that influence the difference between findings and transactional distance theory. It is needed to do more researches for diverse populations to find the relationships between transactional distance theory and online leaning.

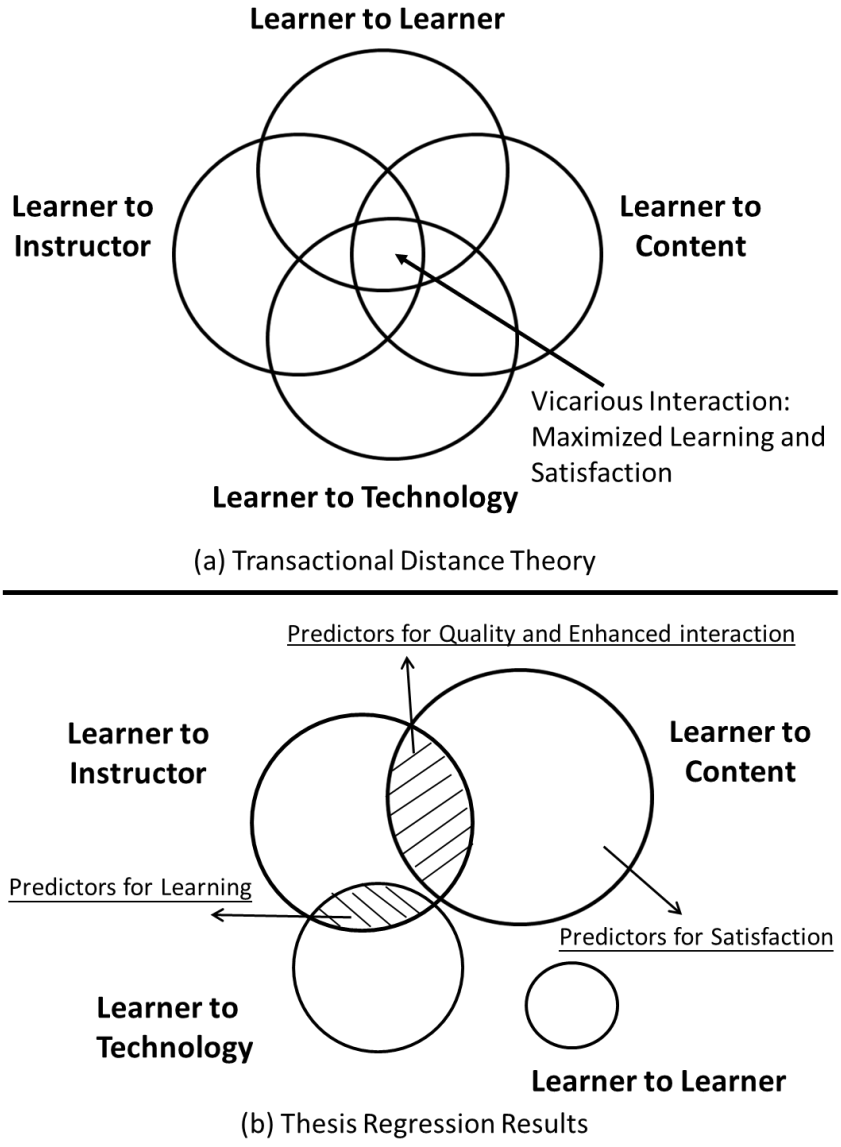


*Figure 2.* Comparison of Moore's (1989) transactional distance theory and results of this thesis. (a) Idea of Moore's transactional distance theory. (b) Thesis Regression results.

There are some recommended technologies for instructors who try to enhance satisfaction, quality, and learning such as lecture, email, online editing and feedback, evaluation of learning, interactive television, streaming video, voice- over Power Points,

online instructional materials, support materials, worksheets, case studies, online tutorials, getting help online, online instructions for downloading plugins, installing software electronic libraries, software applications, and file management system. Instructors have to evaluate and consider about the usage appropriate and correct of the above technologies before using on each course for better learning results.

**Objective nine: Comparison of results to former study.** Comparing the research results of this study and Seidel (2012), both researches point out that lecture, email and online editing and feedback are useful technologies to enhance the learners to the instructor interaction, but evaluation has less influence to enhance the learner to the instructor interaction.

Both two researches agree that support material is a useful technology to enhance the learners to the course content interaction, but Twitter is the less influential technology to enhance the interaction between learners to the course content. Electronic library is the useful technology to enhance the learners to the course technology interaction, but guest lecture is the less influential technology to enhance the interaction between learners to the course technology. However, there is no similarity and difference of technology for enhancing the learner to other learner interaction in both two researches

To sum up, from the comparing results of this study and Seidel (2012), instructors can consider about using lecture, email, online editing and feedback, support material, and electronic library to enhance interactions between learner to the instructor, learner to the course content, and learner to the course technology. On the other hand,

instructors have to care about using evaluation, Twitter, and guest lectures in online courses.

**Overall Conclusion and Recommendations**

According to the findings, there are some relationships between transactional distance theory, technology, and online courses. The results of the regression model point out that the learner to the course content interaction is a significant predictor of satisfaction in online classes. Learner to the course content interaction and learner to the instructor interaction are significant predictors of quality in online classes. Learner to the course technology interaction and learner to the instructor interaction are significant predictors of learning in online classes. Learner to the course content interaction and learner to the instructor interaction are significant predictors of enhanced interactions in online classes. However, there is no interaction effect in learner to leaner interaction to enhance the satisfaction, quality, and learning. From the above data, the learner to the instructor interaction and the learner to the course content interaction are two important factors that influence learners' satisfaction, quality, and learning of online courses.

In order to enhance learners' satisfaction, quality, and learning of online courses, instructors can focus on the learner to the course content interaction and learner to the instructor interaction to design online courses. There are some technologies such as lecture, online editing and feedback, audio/phone call, email, voice over power points, streaming video evaluation can be substantial tools to improve the learner to the instructor interaction. Using case studies, collaborative documents, Power Points, support materials, interactive video, text, online instructional materials, podcasting,

online exercises, and worksheets can enhance the learner to the course content interaction.

Based on the above concepts, there are lots of suggested technologies to instructors that may have influences to enhance learners' interaction and learning outcomes in online learning. But, some of instructors may have problems to use recommend technologies because they do not understand how to apply to online courses. Hence, training may be needed for instructors and learners to use the above suggested technologies to improve their online courses and get better learning outcomes. On the one hand, for professional departments, it is recommended that they should be providing a serious of complete training classes or programs of diverse technologies to instructors. Therefore, online courses' instructors have ability to know features of technologies and understand how to use them appropriately. On the other hand, instructors should teach learners how to use technologies appeared in online courses before the lesson started. Learners have better understanding and experiences of technologies, and they can easily get involving in online learning and have better learning results.

From the results of comparison between this study and Seidel (2012), there are some similarities and differences toward the technology usage and interactions in these two studies. First, lecture, email, and online editing and feedback are three effective technologies to enhance the learner to the instructor interaction, but evaluation is the less influential technology to enhance the learner to the instructor interaction. Second, support material is the effective technology to enhance the learner to the course content interaction, but Twitter is the less influential technology to enhance the learner to the

course content interaction. Third, electronic library is the effective technology to enhance the learner to the course technology interaction, but guest lecture is the less influential technology to enhance the learner to the course technology interaction. From above results, instructors can consider about using lecture, email, online editing and feedback, support material, and electronic library to enhance interactions between learner to the instructor, learner to the course content, and learner to the course technology. On the other hand, instructors have to care about using evaluation, Twitter, and guest lectures in online courses.

Instructors have to evaluate and consider about the usage appropriate and correct of the above technologies before using on each online course for better learning results.

**Recommendations for Further Study**

Based on the research results, there some suggestions to instructors of technologies are useful to enhance four types of interactions in online classes. The learner to the instructor interaction and the learner to the course content interaction are two important factors that influence learners' satisfaction, quality, and learning of online courses. There need more researches in how to improve the learner to learner interaction and learner to the course technology interaction to enhance learners' satisfaction, quality, and learning of online courses. It is also important to find what kinds of technologies can improve the learner to learner interaction and learner to the course technology interaction in online learning.

For people who want to duplicate this research or use the instrument for further studies, there are some suggestions. The reliability of learner to the instructor interaction

($\alpha = 0.59$) in the instrument was poor. According to the reliability analysis, we found that the reliability become acceptable ($\alpha = 0.70$) when the question one (lecture), question seven (evaluation), and question six (audio/phone call) in section two deleted. It means that just ask learners' attitude toward streaming video, email, voice over Power Points, and online editing and feedback to enhance learner to the instructor interaction for better reliability results.

The original instrument developed by the Seidel (2012). The differences of the population in Seidel (2012) and this study include ethnicity, culture, background, and majors. Based on the differences of populations, there are some further studies needed.

Diversities in education background and development of online learning may influence the results of learners' perceptions toward technologies, interactions, and online classes. Hence, there are only few similarities in technology using between Seidel (2012) and this study. There need to more researches for different populations such as students in Asia countries to make sure that are diverse in culture and education background important factor for learners' opinion of transactional distance theory, interactions, and technologies.

The populations of both researches are focusing on agricultural related majors' students in online learning. Students in diverse majors might have different perspectives of satisfaction, quality, and learning of online courses. Besides, different types of majors have diverse requirements of technologies in learning. Hence, majors of the population can be a factor influences the relationships between transactional distance theory, interactions, and technologies.

On the other hand, the population of this research is small and just focuses on one university in Taiwan. The research results may not appropriately to represent the opinions of all Taiwanese students who major in agricultural related departments. Moreover, not all the students in Taiwan are familiar with online classes and technologies so that the results of this research might not represent the real ideas of population. As a result, further researches for large populations and students in different universities needed to find more results.

To sum up, more participants involving in this research recommended increasing the reliability and the diversity of opinions may. Besides, using the same instrument for diverse populations such as differences of culture, background, and majors may find more relationships between interactions and technologies in online education. Moreover, do more researches for enhancing the interaction between learner to learner and learner to the course technology. It is important to find more effective technologies and media for instructors to enhance learners' satisfaction, quality, and learning of online education.

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# APPENDIX A-1

# SURVEY INSTRUMENT (ENGLISH VERSION)

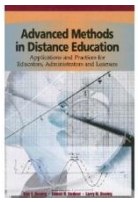
**Statement of research**

The purpose of this study is to describe students' level of engagement, and interaction in a course delivered using multiple delivery strategies. The risks associated with this study are minimal, and are not greater than risks ordinarily encountered in daily life.

This study is voluntary and confidential; the questionnaires were coded to allow researchers to follow up with nonresponders and to insure data from multiple data collection instruments are collated appropriately. Research records will be stored securely.

If you have questions regarding this study, you may contact Ruei-Ping Chang, 979-422-8768, pipikingdom@neo.tamu.edu

What is your favorite way to learn about content for your class?




**Section I: Learner to Learner Interactions**

Read each statement below and indicate whether you agree or disagree by making the appropriate response.

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| The use of online chats could be used to enhance my interactions **with other learners**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of email could be used to enhance my interactions **with other learners**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of audio/phone call could be used to enhance my interactions **with other learners**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of Social Sites (Facebook) could be used to enhance my interactions **with other learners**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of Instant messaging could be used to enhance my interactions **with other learners**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of blogging could be used to enhance my interactions **with other learners**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of collaborative documents could be used to enhance my interactions **with other learners**. | ❑ | ❑ | ❑ | ❑ | ❑ |

**Section II: Learner to Instructor Interactions**

Read each statement below and indicate whether you agree or disagree by making the appropriate response.

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| The use of lecture could be used to enhance my interactions **with the instructor**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of streaming video could be used to enhance my interactions **with the instructor**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of email could be used to enhance my interactions **with the instructor**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of voice over power points could be used to enhance my interactions **with the instructor**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of online editing and feedback could be used to enhance my interactions **with the instructor**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of Audio/phone call could be used to enhance my interactions **with the instructor**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of evaluation could be used to enhance my interactions **with the instructor**. | ❑ | ❑ | ❑ | ❑ | ❑ |

**Section III: Learner to Content Interactions**

Read each statement below and indicate whether you agree or disagree by making the appropriate response.

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| The use of text could be used to enhance my interactions **with course content**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of online instructional materials could be used to enhance my interactions **with course content**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of support materials could be used to enhance my interactions **with course content**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of worksheets could be used to enhance my interactions **with course content**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of case studies could be used to enhance my interactions **with course content**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of Power points could be used to enhance my interactions **with course content**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of interactive video could be used to enhance my interactions **with course content**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of online exercises could be used to enhance my interactions **with course content**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of podcasting could be used to enhance my interactions **with course content**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of collaborative documents could be used to enhance my interactions **with course content**. | ❑ | ❑ | ❑ | ❑ | ❑ |

**Section IV: Learner to Technology Interactions**

Read each statement below and indicate whether you agree or disagree by making the appropriate response.

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| The use of online tutorials could be used to enhance my interactions **with course technology**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of getting help online could be used to enhance my interactions with course **technology**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of online instructions for downloading plugins could be used to enhance my interactions **with course technology**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of electronic libraries could be used to enhance my interactions **with course technology**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of software applications could be used to enhance my interactions **with course technology**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of a file management system could be used to enhance my interactions **with course technology**. | ❑ | ❑ | ❑ | ❑ | ❑ |
| The use of search engines could be used to enhance my interactions **with course technology**. | ❑ | ❑ | ❑ | ❑ | ❑ |

**Section V: Satisfaction, Quality, and Learning**

Read each statement below and indicate whether you agree or disagree by making the appropriate response.

| | Disagree | Agree |
|---|---|---|
| I am generally more satisfied with a learning experience when opportunities for interaction with other students are provided. | ❑ | ❑ |
| I am generally more satisfied with a learning experience when opportunities for interaction with the instructor are provided. | ❑ | ❑ |
| I am generally more satisfied with a learning experience when opportunities for interaction with the technology are provided. | ❑ | ❑ |
| I am generally more satisfied with a learning experience when opportunities for interaction with the course content are provided. | ❑ | ❑ |
| The quality of a learning experience increase when opportunities for interaction with other students are provided. | ❑ | ❑ |
| The quality of a learning experience increase when opportunities for interaction with the instructor are provided. | ❑ | ❑ |
| The quality of a learning experience increase when opportunities for interaction with the technology are provided. | ❑ | ❑ |
| The quality of a learning experience increase when opportunities for interaction with the course content are provided. | ❑ | ❑ |
| Learning increases when opportunities for interaction with other students are provided. | ❑ | ❑ |
| Learning increases when opportunities for interaction with the instructor are provided. | ❑ | ❑ |
| Learning increases when opportunities for interaction with the technology are provided. | ❑ | ❑ |
| Learning increases when opportunities for interaction with the course content are provided. | ❑ | ❑ |

**Section VI: Enhancing interactions**

Is the use of the following technology an effective means for enhancing interactions with other learners, the instructor, the technology, or the content? Choose whether you agree. No response indicates disagreement.

See example below. If you believe that YouTube can be used to enhance interactions with other learners, the instructor, and content, but not technology, you would respond as shown below.

| | With other learners | With the instructor | With the content | With the technology |
|---|---|---|---|---|
| Example: YouTube | ❍ | ❍ | ❍ | ❍ |
| Audio/ phone call | ❍ | ❍ | ❍ | ❍ |
| Blogging | ❍ | ❍ | ❍ | ❍ |
| Collaborative documents | ❍ | ❍ | ❍ | ❍ |
| Case studies | ❍ | ❍ | ❍ | ❍ |
| Email | ❍ | ❍ | ❍ | ❍ |
| Facebook | ❍ | ❍ | ❍ | ❍ |
| Guest lectures | ❍ | ❍ | ❍ | ❍ |
| Getting help online | ❍ | ❍ | ❍ | ❍ |
| Instructor announcements | ❍ | ❍ | ❍ | ❍ |

**Enhancing interactions II**

Is the use of the following technology an effective means for enhancing interactions with other learners, the instructor, the technology, or the content? Choose whether you agree. No response indicates disagreement.

| | With other learners | With the instructor | With the content | With the technology |
|---|---|---|---|---|
| Interactive video conference | ❍ | ❍ | ❍ | ❍ |
| Instant messaging | ❍ | ❍ | ❍ | ❍ |
| Internet links | ❍ | ❍ | ❍ | ❍ |
| Lecture | ❍ | ❍ | ❍ | ❍ |
| Online calendar | ❍ | ❍ | ❍ | ❍ |
| Online quizzes | ❍ | ❍ | ❍ | ❍ |
| Online Chat | ❍ | ❍ | ❍ | ❍ |
| Online tutorials | ❍ | ❍ | ❍ | ❍ |
| Online instructional materials | ❍ | ❍ | ❍ | ❍ |
| Online editing and feedback | ❍ | ❍ | ❍ | ❍ |

**Enhancing interactions III**

Is the use of the following technology an effective means for enhancing interactions with other learners, the instructor, the technology, or the content? Choose whether you agree. No response indicates disagreement.

| | With other learners | With the instructor | With the content | With the technology |
|---|---|---|---|---|
| PowerPoint | ❍ | ❍ | ❍ | ❍ |
| Plurk | ❍ | ❍ | ❍ | ❍ |
| Role play/simulations | ❍ | ❍ | ❍ | ❍ |
| Short online video | ❍ | ❍ | ❍ | ❍ |
| Support materials | ❍ | ❍ | ❍ | ❍ |
| Threaded discussions | ❍ | ❍ | ❍ | ❍ |
| Twitter | ❍ | ❍ | ❍ | ❍ |
| Text | ❍ | ❍ | ❍ | ❍ |
| Voice over PowerPoint | ❍ | ❍ | ❍ | ❍ |
| Worksheets | ❍ | ❍ | ❍ | ❍ |

**Gender**

- ❑ Male
- ❑ Female

**Grade**

- ❑ Freshman
- ❑ Sophomore
- ❑ Junior
- ❑ Senior
- ❑ Graduated

**Department**

- ❑ Agronomy
- ❑ Horticulture
- ❑ Applied Economics
- ❑ Forestry
- ❑ Entomology
- ❑ Plant Pathology
- ❑ Animal Science
- ❑ Soil Environmental Science
- ❑ Soil and Water Conservation
- ❑ Food Science and Biotechnology
- ❑ Bio-industrial Mechatronics Engineering
- ❑ Bio-Industry Extension and Management

**GPA**

- ❑ 90-100
- ❑ 80-89
- ❑ 70-79
- ❑ 60-69

## APPENDIX A-2

## SURVEY INSTRUMENT (CHINESE VERSION)

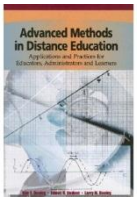
本研究的目的是針對農學院學生調查多媒體教學與學生自主學習能力的交互影響. 藉由一連串的多媒體使用之題組問題, 希望從中了解學生對於網路輔助學習與多媒體的使用狀況對個人學習表現之想法與意見.

本研究結果僅供學術用途,不做其他用途。請依照題組標示依序填答。您的作答對此研究非常珍貴，懇請您認真仔細回答，非常謝謝您的幫忙！敬　祝　平安順心。

對於本研究有任何問題 歡迎聯絡 德州農工大學(Texas A&M University, TAMU)

研究生 張瑞玶 (Ruei-Ping Chang) 979-422-8768,  pipikingdom@neo.tamu.edu

下列哪一種工具或教材是你最喜歡的自主學習方式？




**Section I: 學習者與學習者間的互動構面**

請閱讀以下的句子，根據個人學習狀況，分別給予最適當的回應 (同意或不同意) 。

| | 非常不同意 | 不同意 | 普通 | 同意 | 非常同意 |
|---|---|---|---|---|---|
| “線上聊天室”可以促進我與**其他學習者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| ‘電子郵件”可以促進我與**其他學習者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| “電話聯絡”可以促進我與**其他學習者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| “社群網絡(EX:臉書, 晡浪, 推特)” 可以促進我與**其他學習者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| “即時訊息 (EX:MSN, What’s app, iMessage)” 可以促進我與**其他學習者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| “部落格”可以促進我與**其他學習者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "網路文件/資源分享" 可以促進我與**其他學習者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |

**Section II: 學習者與教學者間的互動構面**

請閱讀以下的句子，根據個人學習狀況，分別給予最適當的回應 (同意或不同意) 。

| | 非常不同意 | 不同意 | 普通 | 同意 | 非常同意 |
|---|---|---|---|---|---|
| “演講授課" 可以促進我和**教學者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "線上短片" 可以促進我和**教學者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "電子郵件" 可以促進我和**教學者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "真人教學影片" 可以促進我和**教學者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "線上討論與回覆系統" 可以促進我和**教學者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "電話聯絡" 可以促進我和**教學者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "教學評量表" 可以促進我和**教學者**之間的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |

**Section III: 學習者與教材內容間的互動構面**

請閱讀以下的句子，根據個人學習狀況，分別給予最適當的回應 (同意或不同意) 。

| | 非常不同意 | 不同意 | 普通 | 同意 | 非常同意 |
|---|---|---|---|---|---|
| ”文字檔案” 可以促進我和**教材內容**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| ”線上電子教材內容” 可以促進我和**教材內容**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| ”課外補充教材” 可以促進我和**教材內容**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| ”學習單” 可以促進我和**教材內容**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| ”案例研究討論” 可以促進我和**教材內容**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| ”投影片” 可以促進我和**教材內容**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| ”互動式影片” 可以促進我和**教材內容**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| ”線上測驗” 可以促進我和**教材內容**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "線上短片" 可以促進我和**教材內容**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "網路文件/檔案共享" 可以促進我和**教材內容**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |

**Section IV: 學習者與系統介面間的互動構面**

請閱讀以下的句子，根據個人學習狀況，分別給予最適當的回應 (同意或不同意) 。

| | 非常不同意 | 不同意 | 普通 | 同意 | 非常同意 |
|---|---|---|---|---|---|
| ”線上教學” 可以促進我和**學習系統介面**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| ”線上小幫手”可以促進我和**學習系統介面**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "線上資源下載教學說明" 可以促進我和**學習系統介面**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| ”網路圖書館/ 電子圖書” 可以促進我和**學習系統介面**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "應用軟體的使用說明" 可以促進我和**學習系統介面**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| "文件/檔案管理系統" 可以促進我和**學習系統介面**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |
| ”搜尋引擎” 可以促進我和**學習系統介面**的互動 | ❑ | ❑ | ❑ | ❑ | ❑ |

**Section V: 滿意度、品質、與學習**

請閱讀以下的句子，根據個人學習狀況，分別給予最適當的回應 (同意或不同意) 。

| | 不同意 | 同意 |
|---|---|---|
| 我相當滿意與其他學習者互動的學習經驗 | ❑ | ❑ |
| 我相當滿意與教學者互動的學習經驗 | ❑ | ❑ |
| 我相當滿意與教材內容互動的學習經驗 | ❑ | ❑ |
| 我相當滿意與學習系統介面互動的學習經驗 | ❑ | ❑ |
| 與其他學習者互動可以提升我的學習品質 | ❑ | ❑ |
| 與教學者互動可以提升我的學習品質 | ❑ | ❑ |
| 與教材內容互動可以提升我的學習品質 | ❑ | ❑ |
| 與學習系統介面互動可以提升我的學習品質 | ❑ | ❑ |
| 與其他學習者互動可以促進我的學習動機 | ❑ | ❑ |
| 與教學者互動可以促進我的學習動機 | ❑ | ❑ |
| 與教材內容互動可以促進我的學習動機 | ❑ | ❑ |
| 與學習系統介面互動可以促進我的學習動機 | ❑ | ❑ |

**Section VI: 促進網路學習的多媒體**

以下提供一系列的多媒體以及網路學習工具。根據個人學習經驗，針對每一項多媒體以及網路學習工具分別選出是否有效促進你與「其他學習者」、「教學者」、「教材內容」、和「系統介面」的互動。「勾選」，表示同意此項多媒體以及網路學習工具有效影響互動;「不勾選」，則表示不同意。

做答請參考舉例: 如果你相信 YouTube 可以促進我和其他學習者, 教學者與教材內容的互動, 但沒有學習系統介面的互動, 你的回應如圖所示:

| | 與其他學習者的互動 | 與教學者的互動 | 與教材內容的互動 | 與系統介面的互動 |
|---|---|---|---|---|
| Example: Youtube | ❍ | ❍ | ❍ | ❍ |
| 電話聯絡 | ❍ | ❍ | ❍ | ❍ |
| 部落格 | ❍ | ❍ | ❍ | ❍ |
| 檔案/資源共享 | ❍ | ❍ | ❍ | ❍ |
| 案例討論 | ❍ | ❍ | ❍ | ❍ |
| 電子郵件 | ❍ | ❍ | ❍ | ❍ |
| 臉書(Facebook) | ❍ | ❍ | ❍ | ❍ |
| 客座演講 | ❍ | ❍ | ❍ | ❍ |
| 線上小幫手 | ❍ | ❍ | ❍ | ❍ |
| 線上課堂相關資訊通知 | ❍ | ❍ | ❍ | ❍ |

**促進網路學習的多媒體 II:**

以下提供一系列的多媒體以及網路學習工具。根據個人學習經驗，針對每一項多媒體以及網路學習工具分別選出是否有效促進你與「其他學習者」、「教學者」、「教材內容」、和「系統介面」的互動。 「勾選」，表示同意此項多媒體以及網路學習工具有效影響互動;「不勾選」，則表示不同意。

| | 與其他學習者的互動 | 與教學者的互動 | 與教材內容的互動 | 與系統介面的互動 |
|---|---|---|---|---|
| 視訊軟體 | ❍ | ❍ | ❍ | ❍ |
| 網站連結 | ❍ | ❍ | ❍ | ❍ |
| 授課/演講 | ❍ | ❍ | ❍ | ❍ |
| 線上行事曆 | ❍ | ❍ | ❍ | ❍ |
| 線上測驗 | ❍ | ❍ | ❍ | ❍ |
| 聊天室 | ❍ | ❍ | ❍ | ❍ |
| 線上家教 | ❍ | ❍ | ❍ | ❍ |
| 電子教材 | ❍ | ❍ | ❍ | ❍ |
| 線上討論與回覆系統 | ❍ | ❍ | ❍ | ❍ |
| 即時通訊 | ❍ | ❍ | ❍ | ❍ |

**促進網路學習的多媒體 III:**

以下提供一系列的多媒體以及網路學習工具。根據個人學習經驗，針對每一項多媒體以及網路學習工具分別選出是否有效促進你與「其他學習者」、「教學者」、「教材內容」、和「系統介面」的互動。 「勾選」，表示同意此項多媒體以及網路學習工具有效影響互動;「不勾選」，則表示不同意。

| | 與其他學習者的互動 | 與教學者的互動 | 與教材內容的互動 | 與系統介面的互動 |
|---|---|---|---|---|
| 投影片 | ❍ | ❍ | ❍ | ❍ |
| 晡浪 (Plurk) | ❍ | ❍ | ❍ | ❍ |
| 角色扮演/模仿學習 | ❍ | ❍ | ❍ | ❍ |
| 線上影片 | ❍ | ❍ | ❍ | ❍ |
| 課外補充教材 | ❍ | ❍ | ❍ | ❍ |
| 討論版/論壇 | ❍ | ❍ | ❍ | ❍ |
| 推特(Twitter) | ❍ | ❍ | ❍ | ❍ |
| 文字檔案 | ❍ | ❍ | ❍ | ❍ |
| 真人教學影片 | ❍ | ❍ | ❍ | ❍ |
| 學習單 | ❍ | ❍ | ❍ | ❍ |

性別

- ❑ 男
- ❑ 女

年級

- ❑ 大一
- ❑ 大二
- ❑ 大三
- ❑ 大四
- ❑ 研究所

科系

- ❑ 農藝學系
- ❑ 園藝學系
- ❑ 應用經濟學系
- ❑ 森林學系
- ❑ 昆蟲學系
- ❑ 植物病理學系
- ❑ 動物科學系
- ❑ 土壤環境科學系
- ❑ 水土保持學系
- ❑ 食品暨應用生物科技學系
- ❑ 生物產業機電工程學系
- ❑ 生物產業管理研究所

學期成績

- ❑ 90-100
- ❑ 80-89
- ❑ 70-79
- ❑ 60-69